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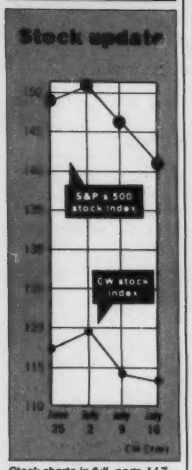

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Wang Laboratories' unannounced laptop boasts a host of communications options. **Page 4.**

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DEC option allows central management of network resources. **Page 10.**

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Computer-aided design managers answer the challenge of blending into corporatewide systems strategies. **Page 69.**

■

Absorbing $140 million in lost profits from last month's 26-day strike by communications workers, AT&T reports an 8.5% decline in second-quarter profits to $422 million. Quarterly revenue slips to $8.42 billion, down 1.6% from the year-earlier period. IBM and Honeywell are also feeling a profits pinch, but Apple, Burroughs and Lotus are better off than one year ago. **Page 118.**

■

IBM has won a contract to supply office automation and communications equipment to Ford over archrivals DEC and Wang, sources said last week [CW, June 30]. Disclosure of the contract, potentially valued at between $300 million and $500 million, has been delayed because of objections lodged by DEC Chairman Kenneth Olsen, a member of Ford's board of directors, the sources claimed. DEC and Ford spokesmen declined comment.

■

Software Publishing Corp. this week is scheduled to announce a series of packages aimed at high-end business users. The products, upgrades of the PFS series, include word processing, file management and a spreadsheet, a source close to the firm disclosed. An integrated package that includes communications facilities, aimed at first-time computer users, is also set to be announced. Meanwhile, Software Publishing announced a loss of $737,000 for the third quarter as revenue

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ADR utility reveals snags

Monitor's 'snapshots' spot DBMS bottlenecks

By Charles Babcock

PRINCETON, N.J. — Users of Applied Data Research, Inc.'s relational data base management system say a performance monitor announced by the firm last week enables them to fine-tune DBMS operations by spotting bottlenecks that originated in the MVS operating system and teleprocessing monitor.

The beta-site users of the monitor, Look/Datacom, claim that, in the past, such bottlenecks were hidden. Although performance monitors have previously been able to highlight operations of the DBMS or operating system and teleproc-

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Link may void DEC warranty

By Donna Raimondi

A third-party company's method of providing users with the ability to cluster Digital Equipment Corp. Microvax IIs and VAXs may jeopardize users' operating system warranties, DEC said last week.

The SI Link, a Systems Industries, Inc. product already in use at some Microvax sites but not yet formally announced, is said to provide users with a function that DEC itself does not offer: the ability to cluster Microvax products together with VAX superminicomputers, much as DEC now encourages clustering of VAX models.

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Volume users to get direct Lotus sales

By Douglas Barney

CAMBRIDGE, Mass. — Lotus Development Corp. will sell its entire product line directly to large corporate customers under a program to be announced by the end of the summer, company spokesmen recently told a private gathering of computer industry consultants.

Under the program, which is seen as Lotus' answer to corporate demands for site licensing or volume purchase agreements, Lotus will not go through computer dealers for its large-volume sales. Instead, the program will involve special bids for purchases of 500 units or more to a single location, and Lotus will provide distribution prices for such purchases.

Analysts speculated that eliminating dealers from large purchases will enable Lotus to pass savings on to customers while maintaining its own profitability.

The company did not disclose a specific date for implementation of the program, although company spokesmen did say it would be officially announced during the third quarter.

Speculation about Lotus selling direct has existed for some time and was reignited earlier this month at a press conference when Lotus announced it would sell The Application Connection, a micro and mainframe data extraction and translation program, through a 50-member direct sales force. The firm also disclosed at that time that it has some 150 people staffing sales offices thoughout the country.

Several consultants admitted attending the private meeting but declined to comment on the proceedings. However, *Computerworld* obtained a comprehensive summary of the program.

"Having a direct sales force is certainly consistent with what Lotus has been mak-

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CW SPECIAL REPORT

Packet pioneer: User gamble on synchronous service pays off

By Elisabeth Horwitt

Signing on as the first commercial user of a new synchronous service offered by GTE Telenet Communications Corp. was a gamble for Advanced Micro Devices, Inc. That gamble has finally paid off, but it took almost two years for Telenet to develop the expertise to provide adequate support to its pioneering customer.

The deal with the Silicon Valley microchip manufacturer presented Telenet, now U.S. Sprint subsidiary Telenet Communications Corp., with a unique opportunity to test its synchronous services at a business site.

Packet-switching vendors were just starting to support synchronous communications in late 1982 and early 1983, when AMD was looking for a "reliable, maintainable, flexible, cost-effective" synchronous connection between field offices throughout the U.S. and an information center in Sunnyvale, Calif.

AMD's Erhart

According to AMD data communications manager Robert Erhart, the 1,200 bit/sec. dial-up connections then being used could not adequately support approximately 250 sales representatives who needed to access the data center's six IBM mainframes.

"Our salespeople need quick access to information center data that enables them to generate reports on parts and product information to help them deal with customers," Erhart says.

To AMD, Telenet's packet-switching service looked like an ideal way to upgrade from 1,200 bit/sec. asynchronous dial-up lines to high-speed synchronous communications without taking on the costly, troublesome job of managing a private leased-line network.

But being Telenet's guinea pig had its painful moments for AMD. Telenet made a number of mistakes and miscalculations while trying to get up to speed in a new network-

See **PACKET** page 6

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NEWSPAPER

Federal agencies spotlight innovation in public sector

By Mitch Betts

WASHINGTON, D.C. — Federal computer executives, stung by the government's recent reputation as a technology laggard, trotted out a few of their innovative computer applications at last week's Government Computer Expo '86.

Federal Bureau of Investigation officials, for example, discussed their use of natural-language processing and expert systems to help criminal investigators.

Susan Church, the bureau's data administrator, said the FBI is using Intellect natural-language query software from Artificial Intelligence Corp. of Waltham, Mass., primarily for prototyping new data base application programs.

She said the bureau can quickly prototype an application by making guesses about users' needs and then refine the model by having users make ad hoc queries using Intellect's English statements.

"Natural-language interfaces are feasible and practicable," Church declared. She praised Intellect for recognizing and clarifying ambiguous queries, tolerating spelling and grammar errors and warning users about "expensive" queries.

The FBI is also building an expert system to help agents investigate organized crime and racketeering suspects, according to William A. Bayse, assistant director of the technical services division. The knowledge base includes the relevant statutes, investigative procedures manuals, expert advice from field agents and the FBI's existing organized crime data base, he said.

Using Intellect as a query language and an inference engine for deductive reasoning, the expert system generates hypotheses about criminal suspects and strategies for further investigation, Bayse said.

Bayse and other federal computer managers said the government rarely gets credit for innovation, despite the fact that there are many advanced applications in the civilian agencies as well as at the Defense Advanced Research Projects Agency, which specializes in artificial intelligence and parallel processing.

Projects under way

Other speakers described a variety of innovative projects under way at federal agencies:

- The U.S. Air Force and Boeing Military Aircraft Co. have developed software for an Integrated Information Support System that integrates the aerospace contractor's incompatible data bases into what appears to the user as a single data base. The pilot project integrates data stored on a Digital Equipment Corp. VAX 11/780 and an IBM 4381.
- The Securities and Exchange Commission (SEC) is developing an electronic filing system to capture and analyze thousands of corporate reports. Likewise, the Internal Revenue Service has tested electronic filing of tax returns (see story page 15).
- The U.S. Navy developed the Document Interchange Format, a set of hardware standards and software that permits the exchange of word processing documents across different brands of hardware. The format has become a de facto standard in many government agencies and may soon penetrate the private sector.

Robert V. Head, who recently retired after a long career as a federal DP executive, said the government's bad reputation for technological innovation can be traced to the anti-government climate of the Carter and Reagan administrations.

Head, now a consultant in Stafford, Va., said another interesting government project is an appellate court case-management system being developed by the Federal Judicial Center. He said it employs AT&T's Unix operating system in a transaction processing environment, rather than a research environment.

Fed users get one-roof shopping

WASHINGTON, D.C. — The market for federal computer trade shows changed dramatically last week with the news that Information Development Corp., producer of the Federal Office Automation Conference (FOAC), acquired the rights to the Government Computer Expo.

In a novel arrangement, the Government Computer Expo will be held jointly next June with FOAC and at least two other vertical-market shows under the umbrella name of FOCIS '87 (Federation of Conferences on Information Systems), said officials of Wayland, Mass.-based Information Development.

At FOCIS '87, there will be separate educational sessions for the Government Computer Expo, FOAC, the new National Office Automation Conference for private-sector users and vendors and a new conference for state and local governments. All will share one FOCIS '87 vendor exposition, officials said.

Information Development acquired the Government Computer Expo from the publisher of the *Government Computer News*, GCN Communications Corp. of Silver Spring, Md. Exact terms were not disclosed.

Ben Hughes, spokesman for Information Development, said the deal is part of an aggressive move to compete in the spring against the Federal Office Systems Expo run by National Trade Productions, Inc. of Alexandria, Va.

Although the move comes at a time when many computer shows are in trouble, the Government Computer Expo and FOAC have been relatively strong productions. Attendance at the 3-year-old Government Computer Expo has grown from 10,000 in 1984 to 13,000 in 1985; 12,000 had preregistered for last week's show, a spokesman said.

—Mitch Betts

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Communications options for Wang laptop

Unit due in fall, to offer VS file transfer ability

By Douglas Barney

LOWELL, Mass. — Wang Laboratories, Inc.'s much-rumored laptop will be announced by this fall and boast a variety of communications options, sources close to Wang said last week.

The Wang laptop reportedly is IBM compatible, weighs 15 lbs and will start at $3,915, which includes a 10M-byte internal hard disk drive; a built-in, letter-quality, thermal-transfer dot matrix printer; and software.

The product's communications facilities center around interactive remote sessions through VS terminal emulation and emulation of Wang's 2110 asynchronous terminal. The machine can transfer files directly to Wang VS systems or through VS to other networked systems by using Wang Office and terminal emulation packages, said Vincent Flanders, associate editor for *Access86*, a magazine for Wang users.

"The aim of the machine is to have a very strong communications ability. It can act as a remote workstation," Flanders said.

The machine can also connect locally to other laptops as well as to Wang Professional Computers and Advanced Professional Computers through its RS-232 port and the use of asysnchronous communications software. A Wang official declined to comment on the machine.

Asynchronous communications packages that will be available for the machine include teletypewriter (TTY) emulation, emulation of Digital Equipment Corp.'s VT100 and 2110 emulation as well as packages developed by third parties.

Synchronous packages include IBM 3276/76 bysychronous emulation, IBM 3276 Systems Network Architecture emulation and other packages developed by third parties. Wang will also offer autodial support for the machine's two internal modems, a $495 model with transmission speeds of 300 or 1,200 bit/sec. or a $795 model with speeds of 300, 1,200 or 2,400 bit/sec. While most of the communications software is optional, VS terminal emulation comes standard, Flanders said.

Users gave the laptop mixed reviews based on the specifications provided by *Computerworld*. "I like it. I might buy one for myself," said Jerrie Michaels, systems administrator for Solar Turbines, Inc. of San Diego. Michaels is most pleased with the machine's IBM compatibility, TTY and VS emulation and built-in printer.

The laptop also got high marks from Don Breipenbach, vice-president of MIS for American Family Mutual Insurance Co. of Madison, Wis. "The key for us is that it could be used as a terminal in the office and then detached and taken out and hooked up by telephone," Breipenbach said. American Family might eventually purchase as many as 1,000 Wang laptops, he said.

One user, however, expressed skepticism about the laptop's networking functionality, based on past experience. "We attempted to use some Wang communications software, and the documentation did not enable us to fully utilize the package," said David Godinez, a consultant with Landau & Bartlestein, a Chicago-based accounting firm. "The software support that Wang provides is pitiful in the extreme. They try hard, but their style of organization is poor," Godinez said.

"It is too heavy, built-in printers don't offer anything for anybody, and it is much too expensive to be taken seriously," said William Zachmann, vice-president for research at International Data Corp., about the laptop.

Although no internal floppy disk drives are available for the machine, users can buy a $575 external 3½-in. or a $405 5¼-in. floppy drive. "Their attitude is simply that most people, when they go out in the field, don't want to mess around with floppy disks, especially for programs like Lotus Development Corp. 1-2-3 that require a key disk," Flanders said.

The machine, which runs Microsoft Corp.'s MS-DOS 3.2, probably has two separate ROM BIOS, according to Flanders, which allow it to run either Wang- or IBM-compatible applications software. Unlike other Wang micros, the user does not have to reboot the system when switching between Wang and IBM applications. The machine cannot, however, run Wang applications that use bit-mapped graphics.

The machine comes standard with 512K-bytes of random-access memory (RAM) and uses an Intel Corp. 8086 microprocessor running at 8 MHz. With its rechargable nickel-cadmium battery, the machine can operate from three to six hours.

The laptop comes with two expansion slots, one for an internal modem and one for another memory expansion. Ports include an RS-232C port, an optional monitor port, a small computer system interface, a 10-pin RJ-14 jack for a numeric keypad and mouse and two RJ-12 phone jacks.

Options for the machine include a $130 acoustic coupler, a $695 512K-byte RAM expansion card, a $95 numeric keyboard, an additional battery pack, a streaming tape cartridge backup system and an automobile cigarette lighter power adapter.

IBM boosts main memory of System/88

By Donna Raimondi

IBM has added main memory increments and disk controllers to its System/88 fault-tolerant machine. The enhancements are said to expand memory up to four times and improve the machine's price/performance.

The enhancements originally came from the System/88's manufacturer, Stratus Computer, Inc. Stratus has been shipping them since July 1 but did not publicize the enhancements because "they are 256K chips, which is not new technology," a spokesman said.

The enhanced memory is available in 8M-byte increments for users of the System/88 4575 Model 20B processor, which brings the maximum memory of that system to 12M bytes. The memory comes in 8M-byte and 16M-byte increments for the 4576 Models 040 and 060 processors, which now can be configured up to 64M bytes. The 8M-byte memory increases cost $36,500, and the 16M-byte memory costs $68,500.

In addition to increasing the memory, the price per megabyte has dropped considerably for the System/88, said an IBM spokesman. For example, on the $51,000 version of the System/88 4575 Model 20B processor, the price per megabyte fell from $12,933 to $7,188 with the addition of the 8M-byte memory.

The controllers allow System/88 direct-access storage devices (DASD) to exchange information with System/88 processors that have main memory greater than 16M bytes. The 1020 DASD controller, selling for $6,630, is used with the IBM 4580 disk drive. The 1030 DASD controller, priced at $9,180, is for the 448M-byte IBM 4581 disk drive.

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Packet pioneer: Gamble pays off

From page 1

ing environment. "Telenet had only dealt with the asynchronous dial-up world up until then," Erhart says. "We were their first customer. To put it very nicely, it's been an educational experience for both of us."

"AMD forced us to develop our synchronous services to the level they are now, especially in the areas of network management and support," agrees Leigh Hamby, director of IBM programs at Telenet. "It took us a while to realize how we needed to customize our customer support for the IBM environment."

Initially, AMD planned to set up a private, synchronous X.25 network by installing packet assembler/disassemblers (PAD) at both the data center and remote sales sites. Telenet was then one of the few vendors supplying private X.25 PADs with synchronous support.

But AMD decided that it did not want to maintain and manage a private network. "We wanted to avoid the trouble and expense of having 3010s at each sales site," Erhart says. "We had enough trouble maintaining the 3274 cluster controllers. Besides, we wanted field office people to concentrate on supporting our customers, not fooling around with communications equipment."

The microchip manufacturer decided to use Telenet's packet-switching service — on the condition that the vendor could provide Synchronous Data Link Control-to-X.25 conversion on its own facilities. Telenet announced such a service in the summer of 1983. By December 1984, 23 of the 37 AMD sales sites were linked to the Sunnyvale data center over Telenet's X.25 network. (See diagram, this page).

Between two and eight IBM Personal Computers or terminals at each site are tied to a 3274 controller to send synchronous transmissions to the nearest Telenet node over a dedicated 4.8K or 9.6K bit/sec. leased line. A Telenet X.25 PAD then converts the synchronous transmissions to X.25 protocols so that they can be routed over Telenet's network, then sent to the AMD data center in Sunnyvale over three 14.4K bit/sec. leased lines. A TP3010 at the data center converts the X.25 packets back to synchronous protocols and sends them on to an IBM mainframe.

Not a bargain

AMD pays between $40,000 and $45,000 per month for Telenet networking services, leased equipment and dedicated access lines. This is not a bargain rate, according to Erhart: "We pay a high premium for the service — 5% to 15% over end-to-end leased-line connections, depending on traffic conditions and distances covered — but it's worth it for several reasons."

The biggest plus is that AMD has been able to leave most network installation, maintenance and management tasks to Telenet. "We only need to have communications staff at our three data center sites," Erhart says. (Field office personnel do not access the other two data centers.) "When we have to move a sales office, I just tell Telenet and they take care of everything." Telenet has been able to obtain leased-line connections between AMD remote offices and the vendor's network centers much more quickly than the typical three- to six-week postdivestiture lead time, Erhart adds.

Erhart notes that AMD would not have been able to cost-justify the high-speed synchronous links at several of the sales offices if it meant installing and maintaining X.25 equipment at each site. "It's a very solid, reliable system now; that's why we've just installed packet-switching connections on four more offices, bringing the total up to 27."

But this halcyon period began only about eight months ago, according to Erhart. In the early days of their relationship, vendor and customer jointly uncovered several problems that needed to be worked out before Telenet's synchronous service could be commercially viable.

Early on, AMD discovered that Telenet had overestimated the number of user circuits that could be handled by a TP3010 PAD at the data center. "Telenet thought one 3010 could handle host access by users in four or five offices," Erhart says. "It could only support three offices." This problem was encountered during the initial testing of the Telenet link and solved before the full network was installed.

The second problem, which took close to two years to solve, arose from the fact that, initially, Telenet's support staff had virtually no experience in synchronous communications. "Telenet's support people grew up in the dial-up world," Erhart says. "They were not trained to handle a synchronous network. When we had a problem, they took too long to arrive and didn't know what to do when they got there. We wound up with extended downtimes and confusion."

Hamby admits that it took Telenet a while to understand the extent of the gap between asynchronous and synchronous networking needs. "For instance, with asynchronous dial-up connections, if one port goes down, the customer can simply dial into another port. We didn't realize at first that this doesn't work with dedicated synchronous links."

AMD's increasingly loud complaints about network downtime helped to galvanize Telenet into overhauling its synchronous support facilities from mid-1983 to 1984, Hamby notes. The vendor trained a team in Systems Network Architecture and set up a synchronous support desk. It also installed additional network diagnostic tools that can recreate or isolate problems in a synchronous environment. "But that wasn't enough for AMD, which has no network management staff of its own," Hamby says. At the microchip manufacturer's request, Telenet provided a support person dedicated to addressing AMD's unique networking needs.

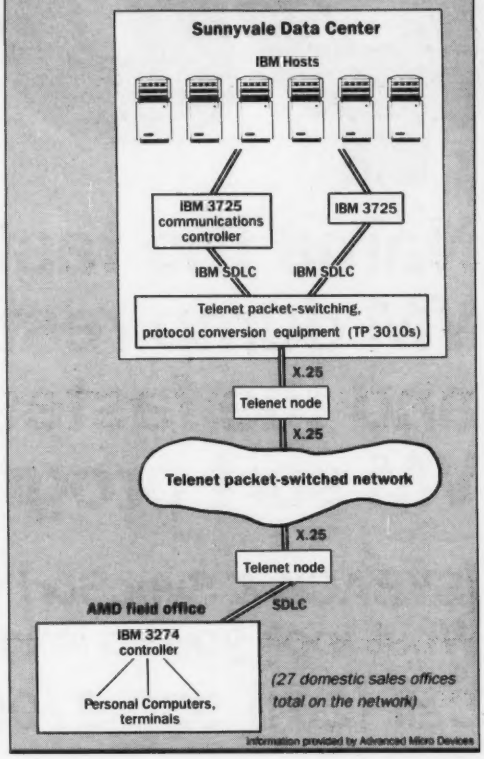
Telenet now maintains ongoing contact with AMD's network. "They call us every evening for the network status of all our sites," Erhart says. "That way we can catch problems before they become serious." Telenet's diagnostic tools can re-create, isolate and fix a network problem — often remotely.

Gradually, during the last six to eight months, AMD achieved its goal of 99% network availability during prime office hours of 8 a.m. to 5 p.m. for sales offices in all U.S. time zones. Prior to that, network availability was between 60% and 80%, Erhart notes. "The improvement is mostly due to Telenet's training and staffing efforts. Now, when we have a problem, they get right on it."

JEFF BABINEAU

Synchronous packet switching

Advanced Micro Devices links 27 field offices to Sunnyvale, Calif., data center via Telenet's network



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Litton shuts N.J. data center, signals time-sharing mart drop

In-house shift blamed for decline in demand

By Alan Alper

FAIRFIELD, N.J. — Litton Systems, Inc.'s Computer Services division will close its data center within the next three or four months as part of a consolidation of its East Coast processing services, *Computerworld* has learned.

A source close to the Litton Systems' division last week said employees were notified on July 11 that the time-sharing operation would be closed on Oct. 3. Computer Services division Vice-President and General Manager Bill Guide acknowledged last week that all processing at the Fairfield operation would be shifted to a sister facility in Reston, Va., "within the next three or four months." The operation's New York sales office, however, will remain open, he said.

Litton's consolidation efforts reflect general trends in the processing services industry. Declining computer and mass storage costs, increased availability of packaged software in addition to the proliferation of personal computers and advancements in communications technology are all factors swaying end users away from time-sharing services and over to in-house computing, according to a report issued late last year by International Data Corp. (IDC) , a market research concern in Framingham, Mass.

"The more traditional portion of the business — time-sharing — is just not as profitable as it once was," Karen Kugel, an analyst with IDC, noted last week.

IDC estimates that the market for processing services will grow from roughly $12.4 billion this year to $16 billion in 1990, a compound growth rate of 7%. Litton Computer Services had revenue of about $38 million last year, $6 million of which was derived from the data center here, Guide confirmed.

The Westlake Village, Calif., firm's decision to close the Fairfield data center had more to do with "duplication of facilities" than with poor business prospects in the Northeast, Guide said.

"We're looking for ways to maximize our capacity and keep our operation as efficient as possible. This is a way of lowering costs, which today is the name of the game," Guide said.

The shift to the Reston data center, which leaves the firm with only one other processing site in Woodland Hills, Calif., will have minimal impact on the firm's Northeastern customers, he noted.

"It doesn't matter to most of our customers, since much of our business is done on a remote basis," Guide pointed out.

Roughly 25 of the data center's 50 employees have been offered positions in Reston, Guide said.

The close of the data center comes roughly two years and three layoffs after it was acquired from Informatics General Corp. In the operation's heyday, around 1981, it employed about 140 people and generated approximately $20 million, sources said.

One source said the operation was closed because it had lost customers to a variety of other time-sharing vendors, such as General Electric Information Services Co., Boeing Computer Services Co. and McDonnell Douglas Information Systems Group.

Guide claimed, however, that smaller, local firms are implementing lower cost structures to win business. "The smaller guys don't have the overhead to maintain. The big guys don't have the economies of scale that they would like," he maintained.

TOP OF THE NEWS

NEWS from page 1
declined to $4.6 million from $9 million a year earlier.

■

IBM executive W. Frank King, responsible for long-term IBM strategies for Unix-based products, has joined the board of directors of the Unix /Usr/Group. King, a key figure in the development of IBM's RT PC, is the first IBM executive to answer the users group's request for IBM representation. "The evolution of AT&T's Unix operating system into a viable commercial product and the development of multiple Unix-based IBM products has created a need for IBM to participate in users groups that are related to the coordination and promotion of Unix-based products," King said.

■

Beta sites for Release 5.0 of Relational Technology, Inc.'s Ingres relational DBMS have begun receiving tapes. One user said last week his first beta tape arrived in early July.

■

Data General is set to release a mid-range Eclipse MV machine in late July or early August, a DG spokesman said. Similar in design to the MV20000 and MV2000 released last year, it is said to equal a DEC VAX 8200 minicomputer in power but is priced similar to the Microvax II.

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BIOS shipped for 80386 systems as vendors seek standard

AT compatibles may challenge superminis

By David Bright

NORWOOD, Mass. — Phoenix Technologies Ltd. last week announced that it shipped ROM BIOS for Intel Corp. 80386-based machines to 15 manufacturers that are designing IBM Personal Computer AT-compatible products around the microprocessor.

By taking advantage of the 80386 chip's increased speed, ability to address 4G bytes of main memory and 64 trillion bytes of virtual memory, improved pipelining and on-chip memory management, the new class of desktop machines should offer performance rivaling that of superminicomputers. In addition to running at least two or three times as fast as 80286-based IBM AT systems, 80386-based systems would be able to simultaneously handle multitasking of applications running under Microsoft Corp.'s MS-DOS, Unix and proprietary operating systems.

One of the first companies to produce an 80386-based machine will be Advanced Logic Research, Inc., of Irvine, Calif. Advanced Logic Research is planning to have its engineering-oriented Access 386 system, which will incorporate the Phoenix BIOS, available by the fourth quarter of this year.

Additionally, Corvus Systems, Inc. expects to ship in the fourth quarter an 80386-based file server using a BIOS developed by Award Software, Inc. in Los Gatos, Calif. Award claims to have six OEMs for its BIOS.

While this is Phoenix's first BIOS that does not emulate an existing IBM hardware environment, Phoenix claimed it had taken care to maintain IBM AT software compatibility. "Other [non-IBM] manufacturers of both computers and boards are moving quickly on 386 products," said Phoenix Chairman Neil Colvin. "The level of compatibility and quality of the ROM BIOS for these systems continues to be a critical design factor."

According to Phoenix, its 80386-based BIOS includes functions designed specifically for the 80386, such as support for processing speeds up to 20 MHz, full 32-bit memory testing, support for the 80387 numeric coprocessor and virtual disk and overlay management features.

Phoenix also announced last week that the Personal Computer Extended Technology Standards Committee had reviewed the preliminary bus standards proposals earlier this month and would release the 16-bit bus specification with a 32-bit extension option by Sept. 1.

Given the possibility of a non-IBM standard, "IBM may be forced to play its hand," observed Jan Lewis, president of the Palo Alto (Calif.) Research Group. "By and large, IBM would not want to come out with an 80386 machine until probably 1988, because it tends to milk product life cycles."

Some vendors have vowed to abstain from introducing 80386-based systems until the market is formed. "We're going to sit on the sidelines on that issue and wait to see in what direction the market goes," commented Ed Juge, director of marketing planning at Tandy Corp. "When IBM enters the market, we'll know what the standard is."

Volume users get direct Lotus sales

From page 1

ing noises about. We think they will have a direct sales force," said Bob Therrien, a member of Paine Webber, Inc. technology group, who was not at the closed meeting. According to Jim Manzi, Lotus chairman, the firm will announce the program by Aug. 15, Therrien said.

However, Lotus spokeswoman Jennifer Strayton said the firm would announce its program by Sept. 5 and declined to release details of the program.

The corporate buying program will reportedly also provide a way to eliminate copy protection for select corporations.

At press time, it was unclear whether dealers would play any role in such sales; however, sources close to Lotus say they believe that dealers will have no role in these corporate sales. "The goal is not to have a middleman," one source said.

In addition, Lotus will offer an "extended value plan." Under this plan, users with at least 500 to 1,000 personal computers, half or more of which are eligible for Lotus upgrades, can pay $125 per workstation per year and receive automatic upgrades, the ability to remove copy protection and credit toward the purchase of Lotus companion products.

Companion products were designed to enhance the use of Lotus core products 1-2-3 and Symphony and include 1-2-3 Report Writer; Hal, an unreleased natural language interface; Symphony Spelling Checker; Symphony Text Outliner; and Spotlight desktop manager.

Limited liability contracts

Large corporations can also receive limited liability contracts under which the firm is liable for only the purchase price of any software that is illegally copied. This will be provided free to any customer with more than 100 Lotus-equipped PCs.

Large and medium-size customers are eligible for Lotus' Corporate Access, which consists of 50% discounts on any two Lotus companion products and toll-free telephone support of up to eight calls per month to a senior Lotus technician.

Small customers will be eligible for Lotus Prompt, which includes the same services as Corporate Access, but will cost $150 per year.

Electronic distribution of software, downloaded from corporate mainframes, will be offered to firms that commit to the purchase of $150,000 or more worth of Lotus products.

The electronic distribution system is currently running on VM-based mainframes and will eventually become available under MVS. Lotus will most likely offer this capability on mid-range systems such as the IBM System/36, a source said. Lotus will also add authorized training centers.

Sources also indicate that Lotus will announce a $495 networking product for network servers by the end of the year. Lotus has publicly committed to releasing a network version of 1-2-3 by the end of the year, spokeswoman Strayton said.

A consultant who asked not to be identified said the Lotus program will result in no real savings to corporations that have been buying in volumes from mail-order firms at low prices. Dealers will not lose much business because they rarely sell in volume to large firms, he added.

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Bridging 1-2-3 compatibility gap

CAMBRIDGE, Mass. — Lotus Development Corp. last week unveiled 1-2-3 Release 2.01. The new version was set to begin shipping today.

Lotus caused a stir among users last September when it introduced Lotus 1-2-3 Release 2, which was incompatible with many user developed 1-2-3 templates as well as a variety of third-party add-on products.

Many firms chose not to upgrade to the new version but were then forced to switch when the original version of 1-2-3 was pulled off the market. Release 2.01, Lotus said, is compatible with Release 1A and Release 2.

One user was skeptical: "We have had a number of incompatibility problems, and frankly, we looked at a beta test of Release 2.01 and still found bugs in it," said Greg Allman, senior consultant with Deloitte Haskins & Sells, a New York-based accounting firm.

Allman, however, said the new release is an improvement over Release 2.

Lotus also announced that versions of Release 2.01 will be available for Digital Equipment Corp.'s Rainbow, Hewlett-Packard Co.'s 150 PC, and Wang's Professional Computer and Advanced Professional Computer. Release 2 has not been made available on these machines. Registered Release 2 users can upgrade for $15.

— Douglas Barney

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12 cyl. PDS Copy				
iebcopy	9 min. 14 sec.	1 min. 20 sec.	10,792	$18.47
PDSFAST	48 sec.	.7 sec.	122	$1.75
47 cyl. PDS Unload to Tape				
iebcopy	58 min.	14 min. 52 sec.	97,253	$92.05
PDSFAST	4 min. 3 sec.	37 sec.	911	$5.74
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SOFTWARE ENGINEERING OF AMERICA SEA

DEC sends centralized network manager up against SNA

RSM assaults Blue stronghold

By Elisabeth Horwitt

LITTLETON, Mass. — A centralized network resource management system introduced last week by Digital Equipment Corp. addresses a market long-dominated by IBM Systems Network Architecture (SNA) products, according to one industry analyst.

The Remote System Manager (RSM) Version 1.0 permits network resources, such as files and software, to be managed from a central server, the company claimed.

The software package converts a VAX or Microvax running VMS into a server that performs file backup, software updates and distribution and printing services for all VAX, Microvax II and Vaxstation II client systems on a network. RSM is compatible with Decnet communications software and Ethernet local-area network protocols.

"Centralizing network expertise makes life easier for everybody by taking the 'use diligence' pressure off the users," said David Terrie, president of Boston-based Newport Consulting.

"You could look at this as a direct counter to IBM, who already offers these capabilities bundled into its Token-Ring network management software, Netview. That has always been IBM's strength: centralized control of a network and the security and staff savings that come with it," Terrie said. With RSM, DEC offers a network management approach that rivals IBM's SNA-based products, he added.

Needed capabilities

The introduction of RSM saved Grumman Corp. the trouble of developing the same capabilities in-house. "That's how much we needed those capabilities," said Robert Meihofer, manager of systems technology for the aerospace company's testing facilities in Calverton, N.Y.

"It addressed our need to maintain all of our systems and application software in a central location," Meihofer said. RSM helped Meihofer's group distill a distributed, multinode network into a single, centrally controlled system, he reported.

"As the number of workstations on a network increases, the responsibility for managing the facilities devolves on the users, who are not always up to it," said DEC Network Interconnect marketing manager Steven Hargrave. "Ethernet already provides facilities for managing network wiring and boards; Decnet manages network node configurations; and RSM allows central management of operating systems and applications."

By enabling system managers to store current versions of operating system source code and application programs in one central location, RSM facilitates "the time-consuming job" of maintaining consistency throughout successive application changes and software updates, Hargrave noted.

The RSM server also performs file backup and restoral for client workstations.

Available in August, RSM consists of two software modules. The RSM Server runs on MicroVMS or VMS operating systems and Decnet VAX software. Prices range from $1,500 for the Microvax II to $7,500 for the VAX 8800. RSM Client runs on MicroVMS and Decnet VAX. Prices range from $300 for the Vaxstation II to $900 for the Microvax II.

ADR utility reveals snags

From page 1

and teleprocessing monitor, no product has offered glimpses into all three at the same time.

The users also noted the new product incorporates the features of ADR's existing MVS performance monitor, ADR/Look.

Two beta-site users said Look/Datacom is able to take a statistical snapshot every 15 minutes of the activities in Datacom/DB, ADR's relational DBMS offering, as well as CPU busy and wait times, paging rates, disk drive use and channel capacities.

With such information, Darren Franchow, data base administrator at Deseret Medical, Inc., a Sandy, Utah, medical device manufacturer, has been able to see what percentage of I/O traffic to his disk drives is related to data base operations.

"If we run into contention between two batch jobs using the same direct access storage device, we can move the data bases closer to the Volume Table of Contents [disk directory]," reducing the amount of arm movement and speeding operation, he noted.

In addition, Look/Datacom counts the number of times data is accessed after it has been pulled off the disk and stored in CPU buffers.

A few weeks ago, 70% of his systems' calls to read data were scoring hits or reading information in buffers. Franchow decided he could improve that average by taking advantage of the 8M-byte memory recently added to his IBM 4381.

He allocated the memory to the operations with the heaviest data base traffic and started getting hits in the range of 85% to 95%, speeding overall performance.

"If I notice this figure going down for one job, I can modify the keys on that data base," he said. Modifying the data base keys ensures that more data will be transferred into buffers when that data base is in use.

In a similiar vein, a Tulsa, Okla., energy producer, Mapco, Inc., has been a beta-site user of Look/Datacom for three months. MVS system engineer supervisor John Young said he considers the buffer "hit ratios" supplied by the product "one of the critical issues" in improving data base management system performance.

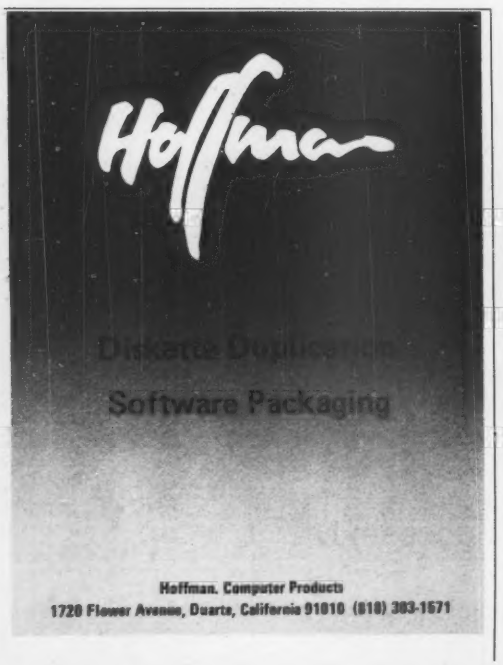
In addition, Young said he has been watching disk arm contention from statistics provided by Look/Datacom and found he could reduce contention by placing frequently accessed data sets on different disk drives.

Look/Datacom's on-line feature enables him to derive a picture of how the DBMS, operating system and teleprocessing monitor, in this case, IBM's TSO running with MVS on an IBM 3083, are functioning together at any time of day.

One reason Look/Datacom appears so powerful to users is the meagerness of its predecessor, the DBMS monitor provided with Datacom/DB. It provided an average of statistics at the end of the day but no data specific to peak usage. As a result, manual records had to be kept of the day's activities before system operators could guess what the statistics meant, according to Young.

Both users said the monitoring of all three systems together represented maximum tuning possibilities. "Now we can look into the data base and, if it's hung up, see if it's because of calls coming from CICS," Franchow said.

Look/Datacom is available immediately at a price of $35,000 for all IBM 370-family mainframes; CICS monitoring is an additional $12,200 option.



IBM offers DB2 monitor

WHITE PLAINS, N.Y. — IBM last week announced a performance monitor for its DB2 that will allow IBM customers to tune up their relational data base management systems.

Called the DB2 Performance Monitor, the widely anticipated product will make users "more comfortable" with DB2 and able to experiment in resolving bottlenecks in its operation, according to Scott Smith, researcher with the New York brokerage house of Donaldson, Lufkin & Jenrette, Inc.

The monitor provides multicolor graphic information on DB2 performance. It will be leased for $975 per month and sold for a one-time charge of $29,000. The monitor is available immediately, IBM spokesmen said.

— Charles Babcock

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Memorex reduces prices on 3270 peripherals, maintenance

Cuts hit printers, controllers, VDTs

By Donna Raimondi

SANTA CLARA, Calif. — Memorex Corp., in a bid to increase sales, has slashed prices by 15% to 50% on its IBM 3270 Personal Computer-compatible peripherals, products and maintenance.

The price cuts encompass display terminals, printers, controllers and port upgrades. "These reductions are part of a strategy to broaden our market share in the 3270 user environment," said Bill Etheredge, vice-president of marketing.

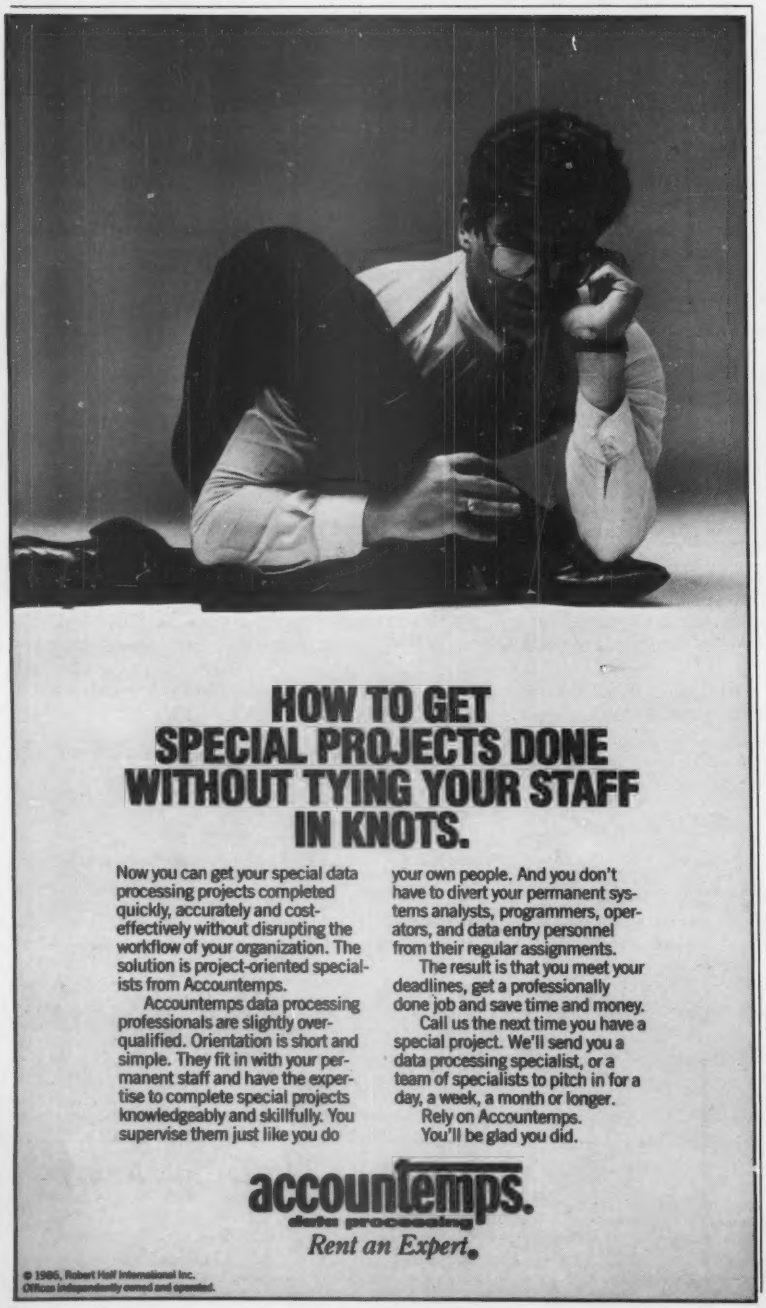
The Memorex 2178 12-in. display terminal, a plug-compatible replacement for the IBM 3178 display, has been reduced in price 27%, from $1,350 to $985.

The company cut the monthly maintenance rate for its 2114-1 printer from $46 to $30, a 35% reduction, while the price for the printer remained at $3,600.

The price for the 2068 multifunction printer was cut by 15%, from $6,495 to $5,495, and a nine-month free maintenance period was added to all 2068s installed in the second half of 1986. The standard warranty is an additional three months. Price, maintenance and warranty changes to remote and local cluster controllers include the following:

- The 2274-2A local controller — price lowered from $17,000 to $12,500 (26%); annual maintenance reduced to $344, a 51% decrease.
- The 2174-8 remote 8-port controller — price reduced from $5,295 to $4,000; maintenance decreased 47%, to $204 per year.
- The 2274-IC remote 8- and 16-port controllers — prices cut by 16% and 22%, respectively, and from $13,000 to $10,200 for the 32-port version; maintenance rate slashed 48%.
- The 8- and 16-port upgrade prices cut in half to $800 and $1,200, respectively.

Prices are based on single quantities, and price changes are effective immediately, Memorex said. The standard warranty on all controller models is extended from three to 12 months.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Link may void DEC warranty

From page 1

However, the SI Link clustering capability requires users to download nine modules from the VAX VMS to the MicroVMS system, a procedure DEC last week said may void its operating system warranties.

The SI Link, which costs approximately $38,000 for a two-CPU starter unit, uses Ethernet as the communications medium and the System Industries' 9900 series cluster servers to give cluster functionality under DEC's VMS 4.0 and above, said James Jones, marketing director.

The SI Link can cluster the entire VAX series, including Microvax IIs, Jones said. DEC's Vaxcluster does not allow the Microvax II to be connected, a DEC spokesman said. In order to cluster Microvaxes, however, the customer must be willing to pull down nine modules of the VAX's VMS operating system that DEC has not included in the Microvax's MicroVMS operating system, Jones said.

"DEC says this is illegal, and it could be sticky about it if it wanted to, but if a customer owns a full VMS license, he can do anything he wants with it. The same goes for leased VMS." The Milpitas, Calif.-based System Industries does not supply or support those modules; the customer must do any necessary software changes.

'Would void warranty'

DEC, however, does not agree that the customer can do anything he wants with his purchased or leased operating system. "We are working on whether or not the move is legal," a spokesman said, "but it almost certainly would void the warranty on the MicroVMS software." At press time, DEC did not have enough information on the new product or its use to respond officially.

"I trust that pulling down the nine modules would work," said Nigel Haslock, a consultant with AGS Computers, Inc. of Mountainside, N.J., who has worked extensively on DEC clusters. "It is not the most elegant approach. It is messy to buy a product that tells you that you have to go find all the bits and pieces, but its probably worth it."

DEC's Microvax II customers have been asking DEC to provide clustering ever since the Microvax came out, Haslock added. "It's the file sharing you want more than anything else, and I'm sure that this would give it to you," he added.

The System Industries system does not use DEC-type computer interconnects, DEC's HSC 50 controllers or RA disk device hardware, as DEC's clustering system does, said an SI Link user in Eugene, Ore. "DEC's system is very pricey compared with this one — it would have cost us more than $60,000," he added, for a system that would not include his Microvaxes. The user's company has two VAX-11/750s and three Microvax IIs hooked together with the SI Link.

'Important to share disks'

An MIS manager at a Canadian university has a VAX 8600 and seven Microvax IIs linked. "We looked at DEC's Vaxcluster, but they can't cluster Microvaxes yet, and it was important to us to share disks," she said.

"We have achieved our goal of being able to read and write from all Microvaxes to all the disks." Asked about the problems in bringing down modules on her 8600's VMS operating system to her Microvax's MicroVMS, the user said, "I can do anything I want. It's my software. I paid for it, and I am running it on the Microvaxes."

The SI Link provides functions such as distributed lock manager, distributed file sharing and distributed job and print queue. It also supports multiported disk controllers and dual-pathed disks, Jones said.

The System Industries cluster system cannot perform shadowing, tape-to-disk or disk-to-tape backup as DEC does through its controller. It is limited to eight CPUs and eight disk drives, as opposed to the 15 each possible with DEC's Vaxcluster.

The Ethernet passes control information, and the SI 9900 server handles high-speed data transfer directly to each CPU in the cluster. An 8M-byte SI Disk Cache Processor can be added to the 9900 server for $15,500.

World Digest

IBM fights clone BIOS

By Charles Brown

LONDON — IBM has reportedly told Computoprocessing Ltd., maker of the Compro 88, an IBM Personal Computer clone, that Compro 88's BIOS contains a substantial part of the IBM PC's BIOS, violating IBM copyrights.

IBM has given the firm 14 days to change its BIOS, but the company claims IBM's accusation is "absolute garbage" and is planning legal action.

Computoprocessing is the latest UK firm to take a stand against threats from Big Blue. Compulink, a PC users group, and two UK vendors — Qubie Ltd. and Hoki Koki Computers Ltd. — have all claimed IBM is using UK copyright laws in a way that violates the laws on competition of the European Economic Community. The European Community Commission has launched an investigation into the allegations.

Earlier this year, in an unsolicited letter, IBM warned British Telecom to avoid buying products that might include illegal components. The letter had reportedly been sent to British Telecom when IBM learned the firm was considering buying PC clones as low-cost alternatives to IBM's machines.

A British Telecom spokesman said the IBM letter referred specifically to the Compro machine, then under evaluation by British Telecom.

IBM confirmed that it wrote to British Telecom but said in a prepared statement that "IBM has not written to any company suggesting that they should not buy a 'particular' PC, nor has IBM taken any action against innocent 'end users' who bought a PC with an infringing BIOS program."

Computoprocessing Director Clive Lambert said he became aware of IBM's intervention when British Telecom asked him to prove his machines were legal. British Telecom has since been satisfied by the Computoprocessing's answer and the fact that the Compro 88 is recommended by the UK Treasury's Central Computer and Telecommunications Agency.

"As far as we are concerned, the machine is squeaky clean," a British Telecom spokesman said.

IBM, however, claimed to have found three elements of the Compro's BIOS — those dealing with video, print screen and timer addressing — in violation of IBM's copyright. An IBM report said there was a similarity of between 78.7% and 94% between Compro's and IBM's BIOS routines.

The differences between the two BIOS, according to an IBM lawyer, do not "in any way alter the IBM programmers' original expression, and in my view these changes have been introduced to disguise the fact that copying has taken place."

Lambert said the charge was groundless. The Compro BIOS, he said, was produced by an outside systems analyst. The similarities found by IBM cover only 10% of the Compro BIOS, he said, adding that those similarities would be present in any IBM-compatible BIOS.

"Putting a copyright on these routines is like putting a copyright on the calendar," he argued.

Itoh, Flexible pact

TOKYO — C. Itoh and Co., a large Japanese trading company, has announced it will distribute and service Flexible Computer Corp. products in Japan. Flexible makes the Flex/32 parallel processing computer. Initial deliveries will begin in the third quarter of this year, C. Itoh said. The Flex/32 reportedly will be marketed by C. Itoh's subsidiary C. Itoh Techno-Science Co.

Japanese Unix push

TOKYO — Eight Japanese computer hardware and software vendors — including Fujitsu Ltd., NEC Corp. and Hitachi Ltd. — have established a group that will seek to port AT&T's Unix operating system to several 32-bit personal computers.

The group, managed by Soft Bank Corp., a software vendor, said it expects a standardized version of Unix within the year. AT&T and Japan's Ministry of International Trade and Industry reportedly will serve as observers.

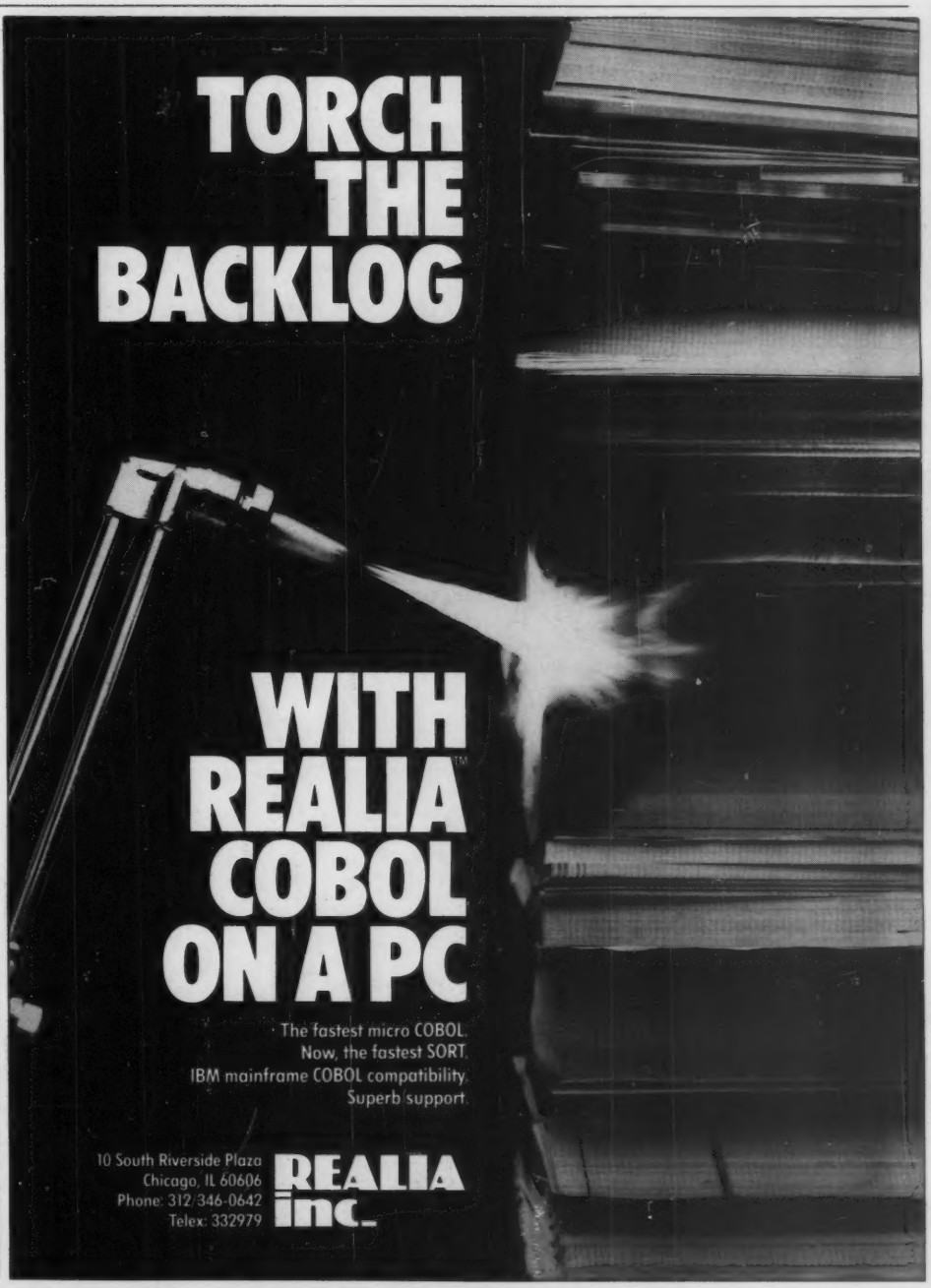
EEC fights chip pact

TOKYO — The European Economic Community (EEC) is opposed to a tentative settlement reached in trade negotiations between the U.S. and Japan semiconductor firms.

The EEC, a 12-nation trade consortium, said it believes its interests have been ignored in the latest rounds of the talks and that Japanese chip exports to Europe may ultimately be restricted.

EEC representatives met with Japanese trade officials for high-level discussions earlier this month in Brussels. The EEC representatives were reportedly reassured by the Japanese that the price monitoring system included in the tentative settlement with the U.S. was only aimed at curbing alleged Japanese chip dumping in the U.S. market.

Information compiled from the Computerworld International News Service.



Parallel expands fault-tolerant line with supermicros, minis

Three-machine rollout aimed at office users

By Donna Raimondi

SANTA CRUZ, Calif. — Parallel Computers, Inc. last week announced three new fault-tolerant systems that range from supermicro to minicomputer size. The systems are all hardware fault tolerant with redundant processors, memory and storage.

Designed for critical applications, the AT&T Unix-based machines will cost from $34,900 to more than $80,000 for basic configurations.

"These systems are really variations on a theme Parallel has been working on for the past four years," said Omri Serlin, consultant at Itom International in Los Altos, Calif. Parallel's prior 300XR system had Motorola, Inc. 68010 chips, whereas two of the new machines contain 68020s.

The new 200XR and 400XR series are intended for installation in the office environment, a Parallel spokesman said. They have fully redundant architecture to ensure continuous operation and complete data protection.

Parallel has had problems reaching the customers who would benefit most from small fault-tolerant systems, Serlin added.

"They are trying to sell in a supermicro market, which attracts first users like small businesses that are moving from a paper office to a computerized office. First users don't understand fault tolerance until after they have had some kind of problem," Serlin said.

Parallel has a missionary job ahead of it, Serlin said. Although it has made some very respectable deals — such as an OEM agreement with Scientific Games, Inc., the Atlanta-based developer of computer systems for state lotteries and a partnership agreement with Ameritech Development Corp., a division of the Chicago-based firm that owns the Bell communications companies serving much of the Midwest — Serlin says he doubts Parallel has sold more than 40 systems since it started shipping the 300XR in April of 1985.

The XR systems contain built-in dual uninterruptible power subsystems to protect them from external power conditions. Each system is able to diagnose, isolate and identify any failure while it continues to run. System modules can be replaced by nontechnical personnel, Parallel said.

The XR series can diagnose itself; a built-in "phone-home" feature allows it to then automatically dial up Parallel's service center. The 200XR incorporates dual Motorola 68010 processors, and the 400XR uses dual 68020s. Basic configurations of both systems include 86M-byte disks, 2M bytes of main memory and eight user ports. Quantity-one prices are set at $34,900 and $39,900, respectively. The 400XR can be expanded to 516M bytes of disk storage and up to 256 ports with a distributed I/O processor option.

A distributed I/O processor allows terminals to be connected to a single computer by attaching 16-port cluster controllers to a local-area network (LAN). The distributed I/O processor costs $11,200 for a basic 16-user model, two of which are needed to add the maximum number of users. Each additional 16 ports added to a distributed I/O processor cost $4,500. The LAN is built into the unit.

The 500XR series has dual 68020 processors supporting up to 8M bytes of memory, 256 users and up to 3G bytes of disk storage. The basic unit consists of 2M bytes of main memory, 168M-byte disks and 16 users for $79,900. Memory can be added in increments of 2M bytes for $8,700 or 4M bytes for $15,900. The 168M-byte storage can be replaced with a 344M-byte unit for $9,500. Additional storage expansion cabinets can be added for $12,000, and a storage cabinet filled with 688M bytes worth of disks costs $52,000. Multiple cabinets can also be added.

To support 256 users, the 500XR also needs the distributed I/O processor.

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Processor runs on single chip

By Maura McEnaney

SANTA CLARA, Calif. — A start-up semiconductor company last week introduced a set of high-performance digital signal processors capable of performing vector processing on a single chip.

Zoran Corp.'s ZR34161 vector signal processor is an integrated circuit with vector processing capabilities that permit operations to be performed on blocks of information or vectors, as opposed to being performed one piece at a time.

Suited for industrial automation, image processing and geophysics applications, Zoran's vector signal processor runs on the IBM Personal Computer AT and Digital Equipment Corp. VAX machines.

Zoran also announced two digital filter processors, the ZR33481 and

In with electronic filing system, out with antique regulations

SEC finds breaking up with paper hard to do

By Mitch Betts

WASHINGTON, D.C. — As the Securities and Exchange Commission (SEC) prepares to turn its experimental Electronic Data Gathering, Analysis and Retrieval (EDGAR) filing project into a full-scale, mandatory system, officials are finding they first must revise decades-old regulations to accommodate electronic filing of corporate reports.

"There are rules that require 8½-by 11-inch paper and binding on the left side, things that are truly paper-based concepts," says Patricia M. Jayne, special counsel for the EDGAR project. "They obviously have to be changed for electronic filing with the commission," she adds.

The SEC is still struggling with the issue of legal signatures, according to Jayne. Federal law requires most SEC filings to be manually signed by a company official, but for the EDGAR pilot project, the SEC bent its rules to allow the use of passwords, or personal identification numbers (PIN), instead.

Although SEC officials plan to continue using passwords with the full-scale system, they are trying to resolve complaints that the passwords are not secure enough.

"Security concerns have been expressed because once the PIN is typed on the filing, it is visible to anyone who has access to the filing before transmission," according to a recent SEC notice that seeks public suggestions on how to resolve the problem.

The SEC is not the only federal agency grappling with the legal issues of paperless government. The Internal Revenue Service plans to store millions of tax returns on optical disk and then destroy the paper copies; however, criminal investigators at the Department of Justice are opposed because that would prevent forensic examination of the fingerprints and signatures on the paper returns, according to Frank Moore, manager of the IRS' optical disk project.

The SEC also is concerned about how to accept graphic and image material as an electronic filing. The SEC tested various systems for handling digitized graphics but found that none of them was cost-effective, so it is planning to allow narrative descriptions of the graphics.

"For example, a description of a pie-shaped chart would indicate the percentages in each of its wedges, their titles and other descriptive information," the SEC document says.

Perhaps the most complex issue facing the SEC is that of data tagging. Although the EDGAR system has full text search capabilities, the SEC says it needs some form of data tagging to isolate specific financial numbers for complex calculations by SEC analysts.

The SEC experimented with a prototype artificial intelligence program called the Financial Statement Analyzer, which had a 94% success rate under controlled conditions. However, SEC officials say it is not yet feasible to integrate the specialized AI program with the EDGAR mainframe data processing environment.

Consequently, the SEC is leaning toward a procedure whereby filers submit a special disclosure form containing the key figures, which the EDGAR system extracts and computes for financial analysis.

Because the EDGAR system will be mandatory for most SEC filings, the agency plans to establish a "hardship exemption" for those who demonstrate that they do not have access to computer equipment or service bureaus.

But Jayne warns that hardship exemptions will be rare since the commission accepts not only direct transmissions but also diskettes prepared on 85 different types of microcomputers and word processors.

The SEC recently issued a request for bids on the full EDGAR system. Responses are due Sept. 10, and a contract is expected to be awarded by year's end, the SEC says.

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the ZR33881.

Zoran said its chip is capable of performing up to 340 million operations per second and is suitable for the implementation of real-time image processing systems.

Used primarily in telecommunications and military applications, digital signal processing takes analog data signals, including information gathered by sensors, and processes them in digital form.

According to Will Strauss, president of Forward Concepts Co., in Tempe, Ariz., digital signal processing architecture is processor intensive whereas traditional data processing techniques are memory intensive. " If you want to process images in real time, you have to have a digital signal processing-based engine," Strauss noted.

Zoran's $700 ZR34161 vector signal processor is priced at $700. The ZR34161 for the IBM PC AT is priced at $3,000, and a version for the DEC VAX is $5,000. The DEC filter processor, available in four or eight stages, is priced from $275 to $490.

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VIEWPOINT

EDITORIAL

The economy as crutch

A stagnant economy like that currently threatening the U.S. can become an all-too-convenient curtain behind which individual companies cloak their own shortcomings. Thus, there are those that are quick to translate the U.S.' general economic malaise into a computer industry slump.

However, invocations of a slump are not heard around Maynard, Mass., where Digital Equipment Corp. continues to feast on 1986. If economic woes have stopped customers from committing capital to information systems purchases, someone forgot to alert DEC's ever-lengthening line of shoppers.

Nor has Wang Laboratories, Inc. been sitting around bemoaning its fate. It has re-examined its priorities, put its product offerings in order, particularly in the area of networking/integration, and taken steps to trim its bloated work force through early retirement incentives. Granted, Wang still faces a few major questions that require tough answers, but its actions show a willingness to focus on solving real problems rather than finding excuses for them.

Ditto Apple Computer, Inc., which underwent Wang-like self-analysis two years ago and last week announced its first revenue increase in five quarters.

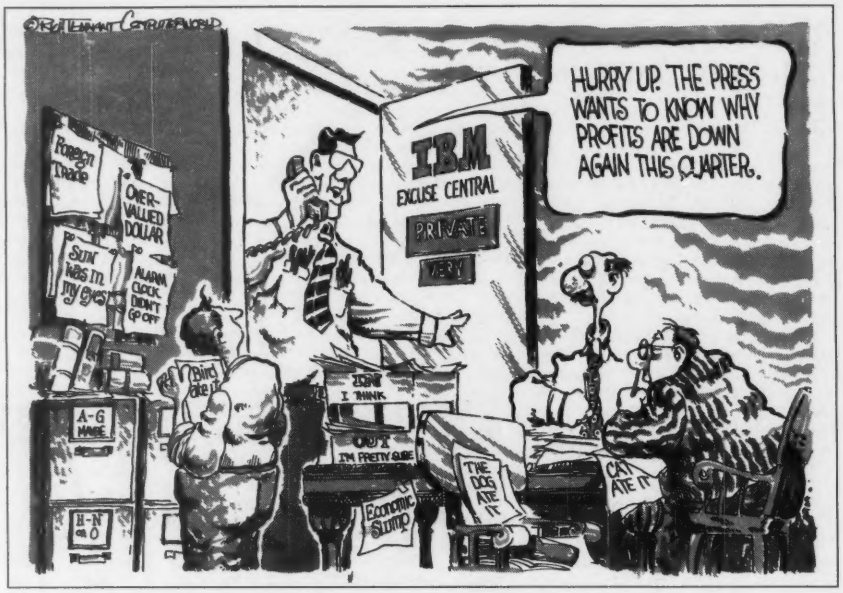
Also in the microcomputer area the top three software firms — Lotus Development Corp., Microsoft Corp. and Ashton-Tate — have soared to new sales heights, proving that good management and good products will sell strongly into the harshest economic environments. The recent successes of micro hardware vendors Epson America, Inc. and Tandy Corp., both written off as contenders at one time or another, serves notice that solid products and rock-bottom pricing can keep savvy competitors in the game.

These exceptions to the supposed industry slump seem to confirm what MIS executives have been saying for some time: they are ready, eager and able to spend on equipment *so long as it meets their real needs.*

So though economic woes contribute, their effect on the industry's health may be greatly exaggerated by poor corporate performers searching for a convenient out. A good hitter will work his way out of a slump. It is up to the management teams at such companies to find a way to get their product batting averages back up, and the simplest way is to begin concentrating on the immediate task at hand: listening to what users really want.

Notes & observations

Kudos to the six high-tech companies tapped by *Black Enterprise* magazine for being one of the "25 best places for blacks to work," and particularly to Xerox Corp., which headed the list. The magazine's list — compiled by polling 600 companies, identifying those with the strongest affirmative action programs and then surveying 1,700 of their employees — reported that minorities are "significantly better off" at AT&T, Digital Equipment Corp., General Electric Co., Hewlett-Packard Co. and IBM as well as at Xerox. At DEC, affirmative action has gone beyond hiring: "We've said [to managers], "You *will* hire women and minorities, and you *will* promote them," said one DEC equal employment opportunity manager. "Now we're trying to change people's attitudes."



LETTERS TO THE EDITOR

Data privacy rights still unclear

After carefully reading the contributions of three responsible spokesmen opposed to federal interagency file matching, I find the issue as murky as ever.

Robert Ellis Smith, publisher of *Privacy Journal*, in his letter "Data sharing threatens privacy" [CW, June 2], likens file matching to a general search of all houses in a neighborhood, which the Bill of Rights prohibits. Herbert R. J. Grosch, dean *emeritus* of the computer jet set, agrees in "Personal data belongs to individuals" [CW, June 2], in effect calling the practice "dragnetting."

The general search of all houses in a neighborhood is a combination of two distinct and independent elements: searching a home without a warrant or probable cause and performing a search repeatedly over a complete area.

The Bill of Rights prohibits the first, but not the second. Smith and Grosch must be taking this unstated logical step: By the association of the two independent elements in the neighborhood search, the second is so contaminated by the first as to become accursed even when occurring separately.

Smith also says "simply . . . that federal agencies ought to comply with the nondisclosure requirements of the Privacy Act of 1974 and the Tax Reform Act of 1976."

Some provisions of the Privacy Act, taken in isolation, appear to place the individual in control of the use of records pertaining to him. However, when taken as a whole with all exceptions and exemptions, the act appears merely to limit the disclosure of personal information to necessary and lawful purposes in pursuit of important public policy needs as determined by specific statutory authority. It also requires written requests, justification and accountability for disclosures.

Smith may be interpreting the act as prohibiting the en masse request, justification and accountability that an interagency file match would require.

The Tax Reform Act of 1976 specifies the agencies to which taxpayer information may be disclosed and does not allow the match with files on welfare recipients and delinquent student loans. The 1984 tax act, according to the editorial "Computers aren't the issue" [CW, April 14], not only allows but requires the match. When Smith asks federal agencies to comply with the law, he excludes the 1984 act.

Grosch says in effect that the individual is the sole and absolute owner of information about himself. He places no conditions or qualifications, and makes no distinction as to type of information. Apparently there is nothing the citizen is required to do or refrain from doing to preserve this expectation of absolute privacy.

Jerry Berman, director of the ACLU Project on Technology and Privacy, in an interview with *Computerworld*, "ACLU technical leader addresses privacy law, civil liberties" [CW, July 7], believes with Smith and Grosch that access to files of personal data should be handled exactly as if the data had been provided under an explicit agreement of absolute confidentiality.

Agreed: Any violation of an applicable, operative nondisclosure statute, rule, explicit or implicit understanding is reprehensible and should be effectively deterred and fully redressed.

But the hard question at hand is the following: What are our rights when we provide information without the inducement of confidentiality? Perhaps the time has come for *Computerworld* to solicit an article from an attorney qualified in the subject.

I have attemped to show that we are still in dire need of knowledgeable but nontendentious answers to these questions:

- What really are our privacy rights, and what (Constitution, statutes, cases) gives them to us?
- Which information about ourselves is intrinsically private and which is not?
- What actions on our part (for example, disclosures to strangers under circumstances other than confidential) operate to waive these rights?
- What are we required to do to preserve our expectation of privacy?
- What would be required in order to expand our privacy rights to the breadth envisioned by Smith, Grosch and Berman?

Daniel J. Lasser
Rockville, Md.

***Computerworld** welcomes letters and publishes those it judges of greatest interest to its readers.*

Preference will be given to typed, double-spaced letters of fewer than 150 words.

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VIEWPOINT

IBM shifts strategy to make clones, profit on software

By ESTHER DYSON

Long ago, IBM decided to launch an experimental little business selling personal computers — much like the ones Apple Computer, Inc. was so successfully selling, but with a different chip inside.

As luck would have it, the IBM name (and a new software package from Lotus Development Corp. called 1-2-3, "similar to Visicalc but better") persuaded a lot of people that this was no toy, and the IBM Personal Computer became a certified success.

In fact, the PC has been so successful that virtually every company in the computer business (and many who entered just to serve this marketplace) has a PC ("similar to IBM's but cheaper"). But the IBM name retained its magic; customers wanted the real thing and were willing to pay extra for it. Until . . .

PCs and clones readily available

Until now. Now you can get the IBM PC anywhere and a reasonable facsimile thereof from anybody. Sophisticated customers now realize it is not a computer they want; they want a box that can run Lotus' 1-2-3, or Ashton-Tate's Dbase or whatever.

Now IBM is in the clone business too. Its PC sells mostly on the basis of price (as indicated by last week's cuts in dealer prices), because customers know they can get the same machine from another reseller or the same capabilities from another manufacturer.

What is IBM going to do about it? A likely short-run solution is to sell an Intel Corp. 80386-based PC that is not quite compatible. If Compaq Computer Corp. did this, of course, no one would buy it, and no software vendors would rewrite their software to run on it. Only IBM can get away with being incompatible. (Its original PC, of course, was not compatible.)

This new system could probably run most existing programs, but to get the full benefit of it you have to use specially written software, which — surprise — does not run on anyone else's systems. But in the long run the other clones will follow IBM's lead, and IBM's edge will be only temporary.

Change the game

But do not get the idea that IBM is losing its power. It is simply shifting attention — its own and the customers' — to software, where the economics work in its favor, and to the DP environment, where it still controls (most of) the customers who buy in volume.

While a PC inevitably costs a certain amount to manufacture and deliver, the incremental cost of a software sale (beyond sales costs) approaches zero.

Thus IBM is at a great advantage in selling software, as it has a larger customer base to spread costs over. (That is, fixed costs are a higher percentage of the total than for hardware, and so each dollar of revenue above the break-even point generates more on the bottom line.)

So, instead of vainly trying to add value to the PC (as Businessland, Inc. and Computerland Corp. are doing) and differentiate it that way, IBM is now selling added value unbundled — in the form of "connectivity" software. By pricing the PCs low and the software high, IBM is acting appropriately to make money at the potentially high-return high end and simply to maintain market share at the profitless low end without bleeding too profusely, if possible.

If the strategy doesn't work, well, IBM's John Akers has intimated that the company may actually abandon such commodity markets rather than stick around at a loss.

Account control

IBM's announcement of 127 separate items at the 1986 National Computer Conference was just the first in a long string of such announcements that will be needed to deliver on the company's promise of connectivity. There is still a long way to go before PCs, minis, mainframes and remote systems will work together seamlessly, but the direction is clear.

You can now integrate your PC nicely into a mainframe environment, with access to mainframe files using the Server-Requester Protocol Interface. Eventually, using Advanced Program-to-Program Communication protocols, you will be able to develop applications that execute partly on the mainframe and partly on the PC. This is no mean programming feat, nor is it a facility you are likely to find in packages on the shelf at Computerland. . . . Score one more point for account control.

Customers may trust commodity manufacturers to build boxes, but most of them will trust only IBM to connect them.

By promoting connectivity — for which there is a genuine need — IBM is thus playing to its greatest strengths. And it is also playing to its customers' preferences, drawing the PC back into the world of MIS and helping its traditional customer base of MIS managers to retain their power.

They are likely to respond with gratitude — or at least with orders for the kind of software that will maintain the centralized world they flourish in.

Dyson is editor and publisher of "Release 1.0," a newsletter covering the computer industry and the transformation of artificial intelligence into a commercial technology.

MIS: Guardian of data, protector of business' knowledge base

READER'S PLATFORM

By SCOTT L. PETTIT

The MIS or DP or Information Division of an organization is generally recognized as having responsibility for custodial care of the corporate asset broadly defined as data. This responsibility normally includes the visible activities of gathering, processing and reporting the data as well as the less visible responsibility of maintaining integrity, retention, security and reconstruction of the data.

In addition, the Information Division also contributes or controls the format, definitions, relational characteristics and longevity of this corporate asset. We assemble the data into information and announce we have responsibility for information management. Thus we are information managers and can rightfully call our group the Information Division.

So far, no problem. We all know these responsibilities and strive to achieve them while endeavoring to persuade others to fully understand the significance of our role.

However, the Information Division, or perhaps more appropriately considered the 'id,' is not only the custodian of the data, but also at least a partial custodian and frequently the ultimate (and often the only) source of definition for the current and collective history of the procedures, processes and new ideas that *are* the business.

All of the business operations that are given to the Information Division are transposed into algorithms, structures and relationships. They are given definite and finite meanings. They are entrusted to computer specialists where they are recorded in glyphics that have translation half-lives related to the tenure of the programmer. The originating business specialist goes on to other issues or career pursuits and is replaced by someone who knows how to request the automated process. Over time, the organization's business processes are archived by the Information Division.

In addition, the Information Division is the focal collector, plays a major definitional role and is the ultimate implementor of all ideas, past and present, that require computerization or integration with computerized business processes.

During the formative stages new ideas frequently assume a relatively clean environment. However, in reality most new ideas and processes have been preceded by other new ideas and processes, each building on the other. Seldom does the old get removed before the new is implemented. The final implementation must deal with the cumulative complexities of this process.

The management of the corporate Information Division comes to us through a multitude of controls and management tools. It is a function of development methodologies, project management, systems analysis, computer languages, modularity, data base management and so on.

Regardless of the tools, the cumulative effect of organizational change leaves the systems designers with the responsibility for homogenizing the new with the old and making sure all variations have been identified and analyzed and that they will produce a logical result regardless of the obscurity or "likelihood it will ever happen."

Can we establish a debt ceiling on change and variations? Establish sunset laws on all new ideas? Throw it all out and start over (just prior to our farewell address)? Hire a competent consultant (not oxymoronic but in much too short supply)?

I suggest that the first task is to help the business understand the dual role the Information Division may be playing. That the custodial responsibility for data and the accompanying information management is a very big and very important task.

But that the unintentional assumption of the knowledge base that rightfully belongs to the functional departments of the organization should not be entrusted solely to minute fluxes spinning about on magnetic media or recorded in some third- or fourth-generation language and filed in a computer program library.

Or should it? What about artificial intelligence?

Is the emergence of expert- and knowledge-based systems in some way a recognition that conventional computerization of the business operations has allowed these operations to grow beyond reasonable expectations for normal comprehension? Is artificial intelligence or even expert systems the solution? Or will it encourage a business to go back to a more manageable set of options?

In the grand scheme of things, is the Information Division intended to be the source of understanding for those processes that have gone beyond normal comprehension?

Pettit is vice-president of MIS for the Farm Credit Banks of Omaha.

***Computerworld** welcomes opinion pieces from its readers. Submissions to the "Reader's Platform" column should be typed, double-spaced and no longer than six pages. Manuscripts become the property of CW, which reserves the right to edit them for the purposes of clarity and brevity. Submissions should be addressed to Editor, **Computerworld**, Box 9171, 375 Cochituate Road, Framingham, Mass. 01701-9171.*

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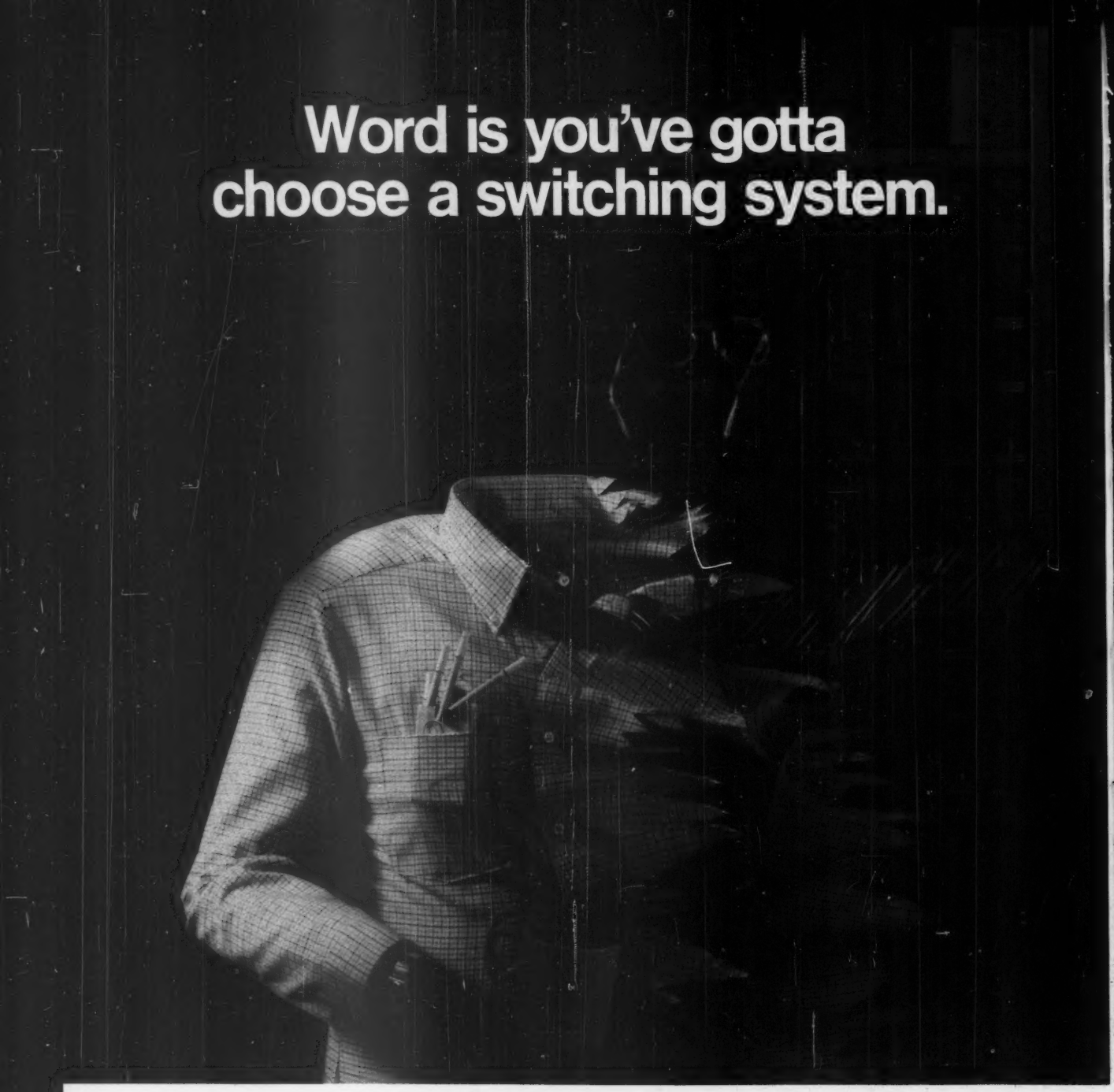

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DATA STREAM
Daniel J. Rosenbaum

Playing politics with regulation

Just when you thought it was safe to go back into the market . . .

This is an election year, so it is not entirely surprising that there are more attempts in Washington, D.C., to change the regulatory underpinnings of the communications industry.

What is startling is the number of such attempts and the apparent power behind them. Congress is trying to take power from the U.S. District Court and give it to the Federal Communications Commission, while the Supreme Court is taking power from the FCC and giving it to the states. All the while, the District Court is being a bit more lenient in its waivers.

Confused? You should be; it is confusing.

Maybe Senate Majority Leader Robert Dole (R-Kan.) did not think the tax bill would keep him busy enough this year. At the reported behest of those in the White House, Dole introduced a measure last month that would move the job of overseeing divestiture from the U.S. District Courts and the Justice Department to the FCC.

There are serious questions about the impact and propriety of the Dole measure. Does the FCC — a regulatory body in the executive branch of government — have any business administering an antitrust consent decree, which was arrived at and administered through the judiciary branch? Does the FCC have legal jurisdiction over the computer and equipment business, hav-

See **PLAYING** page 22

Rosenbaum is chief operating officer of Winston/Smith Associates, publisher of the industry newletter "Wiretap."

VAXs linked on MAP net

Software lets manufacturers develop own applications

By Elisabeth Horwitt

SANTA BARBARA, Calif. — A recently introduced interface from Advanced Computer Communications enables Digital Equipment Corp. VAXs that run Unix to communicate with other devices over a local-area network conforming to the Manufacturing Automation Protocol (MAP) industry standard.

MAPVX enables a VAX running University of California at Berkeley Unix 4.2 or DEC Ultrix-32 to communicate with any other device equipped with a MAP 2.1 interface, said John Risque, Advanced Computer Communications' director for program development.

The device implements all currently completed MAP protocols, he added. MAP is a set of networking specifications based on the IEEE broadband token-bus standard and was designed for factory communications.

The growing number of MAP interfaces from Advanced Computer Communications, Industrial Networking, Inc. and Motorola, Inc. "are not significant until MAP specifications are finalized," commented Dale Kutnick, a senior analyst at Stamford, Conn., consulting firm, the Gartner Group, Inc.

MAP Version 3.0, which should be available late this year or early in 1987, "will have more capabilities than the current version," Risque said. "Our intention is to meet 2.1 specifications and upgrade to the 3.0 version of MAP when it becomes available early next year."

MAPVX consists of a front-end communications processor board, a broadband radio frequency modem board, and VAX-resident software. Upper level MAP communications protocols that are included with the software "provide a framework for applications to be written either

See **VAXS** page 20

Digital Centrex previews ISDN

By Elisabeth Horwitt

NEW YORK — As part of its strategy to provide Integrated Services Digital Network (ISDN) offerings on its central office-based Centrex systems, New York Telephone Co. recently announced Intellipath II, a digital version of the divested Bell operating company's Centrex III analog transmission service.

They also introduced Centrex-LAN, a local-area network that enables customers to send data at rates of up to 19.2K bit/sec. over the same twisted-pair, local-loop connection to the analog Centrex system.

The divested operating company intends to "be the leader of information services in New York state by providing Centrex customers with ISDN capabilities," said Executive Vice-President and Chief Operating Officer Francis Austin Jr.

See **DIGITAL** page 20

Southwestern Bell files to offer regional packet switching

By Elisabeth Horwitt

ST. LOUIS — Southwestern Bell Telephone Co. earlier this month filed for regulatory permission to offer packet-switching services to regional customers. "Theoretically, we could have a tariffed offering by September; but that's pretty unlikely," said product manager Michael Delaney. "Interventions by Tymnet, Inc., Telenet Communications Corp. and the other packet-switching vendors could get pretty heavy."

The divested Bell operating company has requested permission to offer, as part of its proposed Microlink II service, basic packet-switching transmission and protocol conversion. Customers would be able to use the service to link multivendor sys-

See **SOUTHWESTERN** page 22

INSIDE

Gateway Communications adds an asynchronous server/**20**

NEW THIS WEEK

- Western Telematic offers Rab-14 switching system
- Bridge Communications announces communications server

For more on these and other new products, see pp. 81-86.

INSTANT ANALYSIS

"A lot of small technologically sound firms are stillborn because customers won't buy their products, but wait for the bigger guys to come out with standards. The antitrust laws, which are not being enforced, were instituted to prevent this from happening."

— Joaquin Gonzalez, senior analyst, Gartner Group, Inc.

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Board makes PC a net server

By Elisabeth Horwitt

NEW YORK — An asynchronous gateway that enables users to dial either into or out of an IBM Personal Computer local-area network (LAN) was introduced by Gateway Communications, Inc. at the PC Expo held in New York recently. The company also announced support of a new version of its G/Net PC LAN.

A nondedicated IBM PC, Personal Computer XT or AT equipped with Gateway's new G/Async expansion board becomes a communications server through which PCs on the network can share up to 16 asynchronous ports.

The server is bundled with two software packages: Ascom IV, asynchronous communications software from Dynamic Microprocessor Associates, and PC Anywhere, an asynchronous remote control program from Digital Microsystems, Inc.

A G/Async board supporting four ports is priced at $1,440 and available now.

G/Net Plus, the latest version of Gateway's LAN offering, includes as a standard feature the Local Bridge, which connects two or more G/Net Plus LANs. Also bundled with G/Net Plus is Gateway Network Access Method, Gateway's networking software, which provides hooks to the vendor's SNA, X.25 and asynchronous gateways. A two-node G/Net Plus starter kit costs $1,895.

VAXs linked on MAP net

From page 19

by software developers or the manufacturers themselves," Risque said.

File Transfer and Management software handles file transfer between different devices.

Manufacturing Message Service "provides a hook for applications that send commands to robot devices," Risque noted.

Common interface

Common Applications Services Elements provides a common interface for applications that run on top of a MAP network.

Network Management Agent provides a common interface that enables MAPVXs to send network statistics to a network management host for monitoring and analysis.

Advanced Computer Communications claimed that it was able to double the throughput of the MAPVX front-end board by incorporating its proprietary Quadbus architecture.

MAP layers

The front end handles MAP layers two through four, with layers five through seven performed by the VAX software.

Scheduled for beta test in the third quarter of 1986, the MAPVX has a target price of $10,000, Risque said.

Advanced Computer Communications plans to come out with a MAP interface for Q-bus systems such as Microvax II by the end of this year, he added.

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Digital Centrex previews ISDN

From page 19

Intellipath II is available to business accounts that have at least 100 lines and whose sites are served by a New York Telephone central office equipped with a DMS-100 digital switch, Intellipath Product Manager Philip Bruno said. The local carrier has currently installed DMS-100s in approximately 50 out of an estimated 200 central office sites, he added.

Standard Intellipath II features include Touch-Tone support and custom calling services such as three-way calls and access to speed calling lists.

The optional Communications Management Module enables the telecommunications manager to access network traffic statistics and details on calls as well as to reconfigure the long-distance route selection system.

The optional Data Management Module provides 56K bit/sec. data transmission between customer and central office premises.

Centrex-LAN allows computer devices on a customer's premises to exchange data at rates of up to 19.2K bit/sec. via an AT&T Datakit switch installed at New York Telephone's central office. Data and voice transmissions travel over the same twisted-pair, local-loop connection, with a multiplexer routing voice transmissions to the Centrex and data to the Datakit. The service is available only to customers located within 18,000 feet of a central office, Bruno said.

Enhancements to existing analog Centrex systems are increasingly offered by local telephone companies "that are being held hostage by large businesses threatening to put out requests for proposals for digital private branch exchanges," said John Powers, vice-president of strategic services at Dedham, Mass., consulting firm, Telecom Management Corp.

But the new features "do not address user needs in terms of control, data network requirements and costing," he added. "For one thing, users have to pay for each additional feature over and above the basic Centrex rate. I think the solution is to provide digital services to businesses that need them, while leaving analog Centrexes for the users who don't. New York Telephone seems to be doing this."

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Playing politics with regulation

From page 19

ing decided in its landmark Computer Inquiry II that it does not?

If the FCC does have that jurisdiction, what are the implications for the regional holding companies and their customers? The FCC these days is in a deregulatory mood, while the District Court has been scrutinizing carefully each waiver request filed by the regional holding companies.

Perhaps Judge Harold Greene will get the hint that seems to be emanating from the White House and will begin seeing things the FCC's way.

Maybe he has gotten the hint already. While the consent decree prohibits the regional holding companies from any manufacturing domestically, Greene and the Justice Department recently agreed to let Ameritech open manufacturing plants overseas. Similar waivers are certain to follow. The holding companies are not likely to get permission for manufacturing domestically for quite some time, but their overseas operations will position them well in the event the decree is eased.

While the Senate is trying to increase the FCC's powers at the expense of the District Court, the Supreme Court found a way to reduce the FCC's sway and give more power to the states.

The high court found recently that states are allowed to overrule the FCC when it comes to equipment depreciation rates for local phone companies. The decision seems fairly esoteric; the precedent it sets is alarming and may have a dramatic effect on your business and phone service.

Depreciation schedules are extraordinarily important to the telephone companies. Depreciation rates directly affect phone rates, so they are a frequent target of state Public Utility Commissions.

Pacific Bell, in the days before divestiture, was virtually held hostage by the California Public Utilities Commission, which forced the telephone company to depreciate its equipment so slowly that it was unable to perform adequate expansion and maintenance. Rates were kept low but at the expense of service.

If the states have sole authority to set depreciation schedules, there is a real danger that local politics could overshadow the needs of either a local telephone firm or its customers.

The implications of the Supreme Court's ruling are even more worrisome. To date, the FCC has had sole authority over all communications activities, based on the assumption that the intrastate portion of communications was part and parcel of any interstate communications. When all communications were carried by one company, that undoubtedly was true.

Today, though, interstate and intrastate communications are often handled by entirely different corporations. Does the federal government have any authority over purely intrastate transactions? If not, can telecommunications rationally be administered on a state-by-state basis?

The regulatory story did not end with divestiture. The rules are constantly evolving, and many of the changes will have a direct effect on you and your business.

More to the point, you can have some effect on those changes. Make friends with representatives of your state Public Utilities Commission. Pay a visit to your congressman. Whatever your viewpoint, make it known — because the moves are happening now. And if you do not speak up now, you have got no business complaining when the game does not suit you later.

SIS HAS FOUND A NEW HOME AT DUQUESNE SYSTEMS

Duquesne Systems, a long time leader in providing software for managing shared devices for MVS and MVS/XA users, is now home for the **Single Image Software** product line. SIS products let you effectively manage the sharing of tape drives, DASD, and consoles, while maintaining data integrity.

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Southwestern Bell packet switching

From page 19

tems at different sites, Delaney said.

"A local packet-switching service benefits customers because it enables them to cut down on communications installations," Delaney explained. "Instead of installing communications hardware and software to handle an array of bisynchronous, Synchronous Data Link Control and asynchronous devices at various sites, customers can leave all that to the network service."

Another potential benefit offered by Microlink II is better quality of service through redundancy, error checking and other reliability and management features that can be built into the all-digital network, Delaney said.

The service will also act as a link to interstate public packet-switching network vendors such as Telenet. "Although we realize that in some cases we'll be competing with the interstate networks, we want our primary thrust to be complementary," Delaney said. "We have customers now who are not in areas served by Telenet."

In order to win Federal Communications Commission permission to offer protocol conversion, Southwestern Bell must prove that it will keep separate its regulated and nonregulated operations, Delaney said.

"The value-added network vendors want to make sure we don't use profits from our regulated telephone business to subsidize new, competitive offerings. We also have to prove that our marketing and sales people don't get special access to the telephone company's customer base," he explained.

Microlink II rates will average 3½ cents per kilocharacter, with volume and time-of-day discounts available.

SOFTWARE & SERVICES

SOFTLINE
Norman L. Wilson Jr.

Disclaiming 'as is' software

"The software herein is provided 'as is' without warranties of any kind, either expressed or implied."
— software package disclaimer

If you buy a government surplus auto and find it needs repairs, the fact that the car was advertised as being in good repair will not help much. Courts have upheld the no-warranty-provided disclaimer in the sales contract, shifting risk to the buyer.

It doesn't seem fair, does it? Yet "as is" disclaimers appear to be the current philosophy in the software industry. Whether they can endure in an era of consumer protection is open to question.

Warranty disclaimers are not popular devices. Courts have begun tagging them "unconscionable" and "unilateral, self-serving statements."

In line with that thinking, a seller is allowed to exclude, or disclaim, warranties only under certain conditions. Courts are then free to decide what those conditions are. Using this discretionary power, the courts have begun chipping away the warranty disclaimer doctrine.

"Disclaimers should be brought to the buyer's attention before the contract for the sale is made," the courts have stated. "They become self-serving when the buyer learns of them after the sale.

"The disclaimer must be so conspicuous that a reasonable person will notice it," they continued. "It must be communicated to the buyer."

See **DISCLAIMING** page 27

Wilson is a St. Louis patent attorney.

AI to drive 5GL software

Added functionality to move applications work to users

By Charles Babcock

BURLINGTON, Mass. — Fourth-generation languages are a transitional step to a fifth generation of software that will use artificial intelligence, according to George Schussel, president of Digital Consulting Associates, Inc.

The added functionality of fifth-generation languages will allow application development to move out of the data processing center and into end-user departments, he told the 170 attendees of his firm's conference on Software Trends for Executive Planning and Strategy in Burlington last week. The noted data base management system expert led off the conference with a discussion of fourth- and fifth-generation technologies.

Schussel said a fifth-generation solution to the applications backlog is unlikely to arrive overnight.

Unlike third-generation languages, such as Cobol, there is no standard defining a fourth-generation language, nor is there likely to be one.

"The National Bureau of Standards came to me and said they wanted to set a standard for fourth-generation languages. I had to tell them the languages are changing so rapidly, you can't put any standards on them," he said.

Instead, the languages will continue to evolve, adding functionality, and "one day we'll just say we're in the fifth generation," he said.

A fifth-generation language will be built around an active data dictionary "driving an array of software," including a DBMS and development language. It will also rely on expert systems that design data bases, provide automatic data access methods in response to queries and generate code from program designs, Schussel predicted.

Artificial intelligence offers the prospect of providing greater end-user access to the development environment through speech recognition and natural language interfaces, he continued.

See **AI** page 26

IBM low-entry SNA extension creates decentralized net for small processors

By Charles Babcock

WHITE PLAINS, N.Y. — IBM recently announced an extension of its Systems Network Architecture (SNA) that is said to allow Series/1, System/36 and 38 processors to be tied together into decentralized networks.

Called SNA Low Entry Networking (LEN), the extension can also tie together System/88s and 3820 page printers. IBM's previously announced System/36 peer-to-peer networking is based on SNA LEN. LEN will be available in the fourth quarter, company spokesmen said.

SNA LEN uses one set of protocols to establish SNA sessions as required between 2.1-type nodes on a network. The 2.1-type nodes include the Series/1, System/36 and 38 processors. The network is decentralized, company officials said, with each node having its own control point, unlike a mainframe SNA session in which a host serves as a centralized control point.

Physical connections between nodes may be leased telephone lines, switched lines, connections across a local-area network, X.25 virtual circuits or X.21 connections, IBM spokesmen said.

Each node maintains a directory of local logical units and logical units on peripheral nodes attached to it but not to the network. A request to connect to another logical unit initiates a search of the local directory. If the logical unit cannot be found, the Locate request is sent to adjacent nodes, which in turn send requests to their adjacent nodes until the object of the search is found.

Because each node will pass on the re-

See **SNA** page 26

INSIDE

Wang unveils a package that eases creation of office data bases/**26**

Management Science America adds a billing module to its accounts receivable package/**27**

NEW THIS WEEK

- Aion Corp. offers an application development tool for IBM's 370

For more on this and other new products, see pp. 81-85.

INSTANT ANALYSIS

"The information center was a transition avoidance strategy: 'Implement end-user computing, and the backlog will decrease.' It was the opposite. It stimulated demand for applications."
— Vaughan Merlyn, Merlyn Consulting, Inc., at the Software Trends for Executive Planning and Strategy conference

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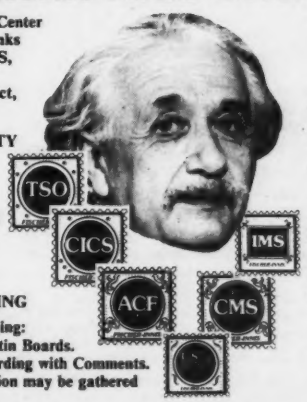

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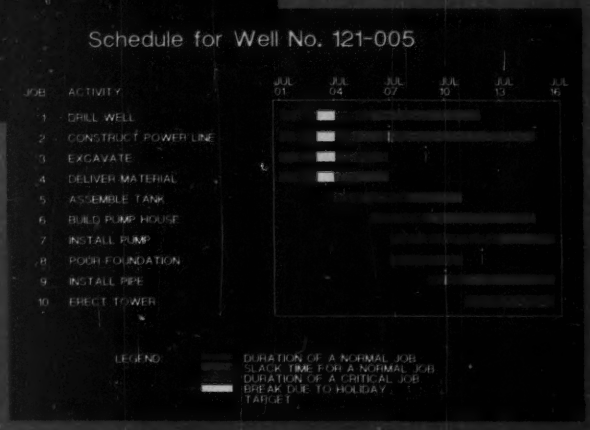

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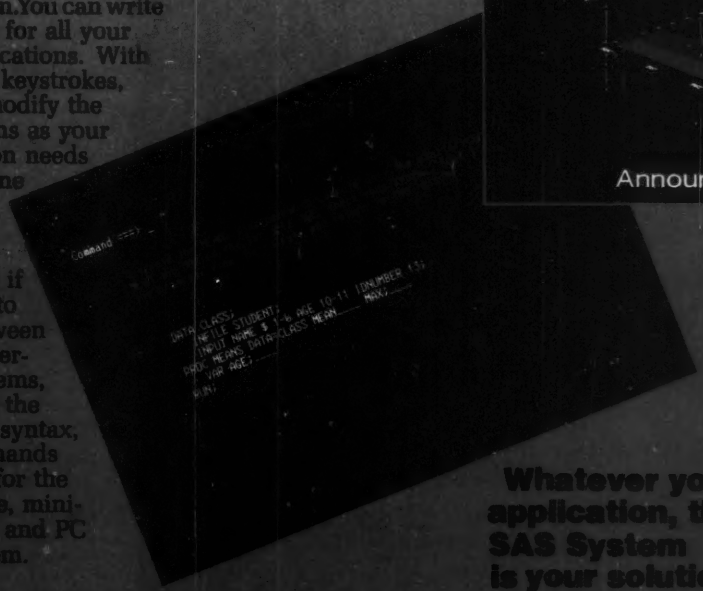

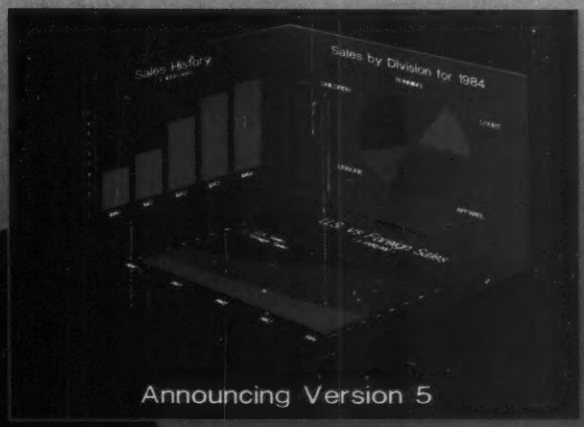

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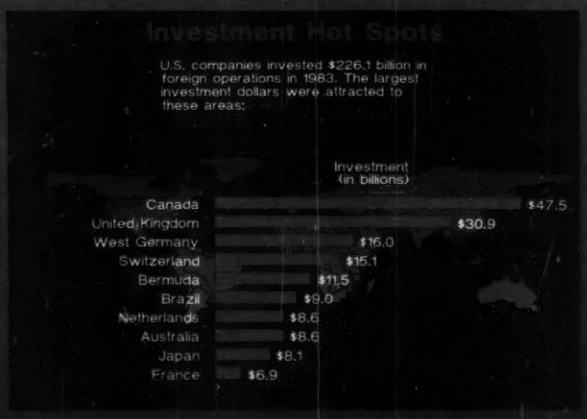

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Wang package aids data base programming

LOWELL, Mass. — Wang Laboratories, Inc. recently unveiled Memorybase, a package for creating office data bases and applications without the assistance of professional programmers.

Memorybase offers a subset of the features of Wang's Professional Application Creation Environment (PACE) and uses Wang's VS DMS/TX data management system, providing the recovery and integrity features of that system, Wang said.

Users may organize data as a collection of records and subrecords. Memorybase permits number, character, digit, date and time fields and text fields of up to 2,020 characters. Users may locate records either by searching on specified fields or by performing a words-in-text search, company spokesmen said.

The product is integrated with Wang Office, Wang Word Processing and other Wang office applications, spokesmen said.

Available in August, Memorybase is licensed for $4,000 on Wang VS 5, 6, 15, 25 and 45; $6,000 on VS 65, 85, 90 and 100; and $8,000 on VS 300.

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AI to drive 5GL software

From page 23

The development environment will tend to migrate to high-powered workstations, where users will have the undivided power of the workstation processor, he said.

Schussel's other comments on software trends included the following:

- IBM's promotion of DB2 does not mean the game is over for independent DBMS vendors. DB2 is installed in fewer than 1,000 sites and will represent only 8% of the market by 1988.
- "The time for AI commercial success is close at hand," and some companies have already quietly incorporated human expertise into applications. The expert systems, however, cannot handle a broad range of business problems.
- AT&T has succeeded in pushing Unix System V as a standard.
- A $500 million subsidiary software industry will grow up on the beltways of Washington, D.C., devoted to developing Ada applications for the government.
- The software industry will continue to grow by 40% a year and by the early 1990s will represent 30% to 40% of the information industry.

SNA addition creates net

From page 23

quest until the unit is found, the search can be conducted without the originating node needing prior knowledge of the network's topology. The feature also offers flexibility in network formation, avoiding the restrictions of star, ring or other configurations, IBM spokesmen claimed.

The network honors message priorities, moving higher priority messages first, and provides flow control to make sure messages are not lost if buffer capacities are in danger of being exceeded, spokesmen noted.

Disclaiming 'as is' software

From page 23

Continuing to scrape away at disclaimers, courts carefully scrutinize the warranty disclaimer to determine if it complies with statutory requirements. They examine the language to ensure there is no doubt that both parties intended a disclaimer. Courts also consider the reasonableness of the disclaimer. All of this indicates that courts look on warranty disclaimers with disfavor.

It appears that a disclaimer is permitted to override a guarantee of fitness depending upon whether the defective goods result in a monetary loss, injury or property damage. If the defect results in personal injury or property damage, the disclaimer will be found an ineffective tool. On the other hand, if the loss is only an economic one, the warranty disclaimer may be effective.

> ***Continuing to scrape away at disclaimers, courts carefully scrutinize the warranty disclaimer to determine if it complies with requirements.***

Also considered is the sophistication of the purchaser. If the purchaser is knowledgeable, it is more likely he was willing to assume the "as is" risk.

These guidelines may not be useful very long. There is a growing feeling that software should be subject to the same standards of quality other goods must meet. The California state legislature proclaimed this view recently when it proposed a bill (Bill AB1507) prohibiting the use of the warranty disclaimer in software marketing.

If the bill passes, California will no longer sanction the sale of "as is" software. Return privileges, lawyers' fees and some measure of damages are provided for in the bill.

Even before California aimed its proposal at the software industry, many states had gradually abandoned the concept of relieving a vendor of product liability through the use of a warranty disclaimer. Disclaimer-containing contracts have not been enforceable in Georgia, Kansas and Maryland for a dozen years.

More recently, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Vermont, Washington and West Virginia placed limitations on a manufacturer's right to disclaim or avoid standing behind his goods. How, then, is software to be marketed?

In the case of elaborate, complex software, perhaps a method resembling chemical sales is workable. A technical sales representative might run the program in the purchaser's system prior to purchase. Another method might be to provide the program under a confidential disclosure agreement for a specified test period, after which the software would be leased or purchased.

The effect of the disclaimer of warranty is to shift the risk of program failure to the buyer. Whether the software developer can continue to shift such losses is in doubt.

CLARIFICATION

A story on Martin Marietta's Ramis II [CW, May 19, p. 4] stated "tests of DMF Concurrency showed it performed about 4.5 transactions per second lightly loaded with 19 users."

To clarify the situation, Robert E. Roach, director of Ramis II marketing, said there were 51 on-line Ramis II users in addition to the DMF Concurrency users.

Management Science America adds billing capability to account system

By James A. Martin

ATLANTA — Management Science America, Inc. recently introduced a billing module to be added to its accounts receivable system, an addition that will reportedly enable users to track customer relationships throughout a sales cycle.

The module, priced at $45,000, was designed to provide on-line and remote entry of order information, automatic tracking of detailed sales history and the ability to make inquiries into the status of both open and closed orders.

It runs under MVS and DOS/VSE, as does Management Science America's accounts receivable package, on IBM 370 family mainframes.

The module was designed to provide real-time update capabilities and also pricing, invoice generation and complete sales and use tax capabilities, company spokesmen said.

The company further reports that the billing module was designed to enable faster response to customer inquiries and to ensure proper handling of customer requests. In addition, it can provide information on outstanding receivables, spokesmen said.

The module will be available in September.

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SYSTEMS & PERIPHERALS

HARD TALK
James Connolly

Battles in the super market

Now, the rules are changing. The attacks on the supercomputer market are coming from all directions — from start-ups, from established U.S. vendors jumping into a new field and, at last, from Japan.

For many years, the supercomputer industry consisted largely of Cray Research, Inc., a few well-meaning start-ups like Denelcor, Inc. and a wing of Control Data Corp. They would shout that they had a way of solving big problems that were unworkable on traditional mainframes, and they did battle in an arena in which some observers thought only a dozen or so machines would be needed nationwide. That dozen-or-so figure was surpassed a few years ago.

But indicative of how fast the supercomputer industry has changed is the fact that 14-year-old Cray is now the veteran — the establishment — that is the target for the newcomers. Cray has become king of the hill and has boosted the installed base by taking about 30 orders a year for the past two years. Newcomers now use Cray's performance numbers as the standards by which they measure their own systems. Even some of those vendors who don't claim to be better than Cray have invoked Cray's name in their press releases or have sought to be compatible with Cray equipment.

Within the past year, the fight for the supercomputer dollar has heated up, with IBM seeking to head off users considering moves to Cray machines by

See **BATTLES** page 30

Connolly is Computerworld's *senior editor, systems & peripherals.*

Centronics enters laser mart

Pageprinter keys effort to revitalize profit outlook

By James Connolly

NASHUA, N.H. — Attempting to drive from its long-term position in the dot matrix printer market into the nonimpact printer market, Centronics Data Computer Corp. has introduced its first laser printer.

In addition to releasing its 8 page/min Pageprinter 8, the company announced two low-end serial dot matrix printers, a value-added reseller support program and a twin-axial interface to link its current minicomputer and mainframe printers to the IBM System/34, 36 and 38.

Company officials said the announcements are keys to rebuilding a revitalized Centronics, a company that reported annual losses from 1981 through 1984 before posting a $648,000 net in 1985. "Centronics today is a much stronger company than any of you may be familiar with," said Robert W. Kilcullen Jr., vice-president of sales for Centronics, in introducing the products to analysts and the press.

Kilcullen said the desktop laser printer is only the first in a family of laser printers and that printers with higher speeds will be offered within the next year. The laser printer, like other Centronics products, is targeted at the reseller and OEM markets.

The Pageprinter 8 was designed to work with multiple personal computers in office environments. Centronics claimed that the $2,495 printer will provide price/performance gains over existing laser printers in its class because of its high duty cycle, the durability of its consumable components such as developer and toner and its ability to emulate various popular nonimpact printers. The company claimed a per-page user cost of 2.7 cents, a 5,000 page/mo duty cycle and a life cycle of 300,000 pages.

The laser printer is based on Sharp Corp. electrophotographic copier technology and a Motorola, Inc. 68000 microprocessor as a controller. Standard memory is 256K bytes; a 1.5M-byte memory

See **CENTRONICS** page 31

Apollo launches prepackaged systems based on Domain series

By Rosemary Hamilton

CHELMSFORD, Mass. — Apollo Computer, Inc. has introduced the first in what it said will be a number of prepackaged systems based on its Domain Series 3000 Personal Workstations.

Customers who purchase the packages are offered discounts from application software vendors participating in the Apollo program.

The first package is aimed at the computer-aided software engineering (CASE) market, and the vendor said it will announce additional packages this summer. Five software vendors, including Cadre Technologies, Inc., Intermetrics, Inc., Oasys, a division of Xel, Inc., Teledyne Brown Engineering and Thomson-CFS, are offering application packages for the CASE systems at discounts ranging from 25% to 44% on single licenses.

In addition, Apollo will offer a 10% discount on a one-year warranty option, a 40% discount on installation charges and a discount of up to 23% on training courses.

According to Ken Pomper, marketing manager for CASE, Apollo decided to market prepackaged CASE systems because "it was confusing to customers when we came out with all these software tools and didn't really say how they fit together."

The CASE package is offered in three configurations. The CASE Starter Pack, which sells for $89,900, comes with five Domain Series 3000 Personal Workstations with 4M bytes of memory each, three 72M-byte disks and a 60M-byte cartridge

See **APOLLO** page 31

NEW THIS WEEK

- Digital adds a two-screen configuration on Vaxstation II/GPX workstation
- Omnicomp Graphics offers a graphics display system for the Multibus II

For more on these and other new products, see pp. 81-85.

INSTANT ANALYSIS

"This is not a good time to be selling technology. The market is depressed and people are not making investments over and above what they need."

— Trilogy Ltd. President Gene M. Amdahl on whether Trilogy plans more deals like the $10 million packaging technology sale to Digital Equipment Corp.

Users warming up to Sun following winter of discontent

Usenet support up, growing pains quelled

By Rosemary Hamilton

Sun Microsystems, Inc. has recently responded to numerous complaints of poor support and service by beefing up its efforts in those areas, with the result that a number of users that were highly critical of Sun last winter are now saying they are satisified with the vendor.

"All the complaints I had are now in the past," said Mark Plotnick, a member of the technical support staff at the Murray Hill, N.J., facility of AT&T Bell Laboratories. "As of now, I can't think of any outstanding problems."

Plotnick was one of several Sun users who voiced their concerns about Sun early this year on the Usenet electronic bulletin board, which is primarily for users of the Unix operating system. Sun 32-bit workstations run under University of California at Berkeley Unix 4.2.

Overall, users characterized Sun as a company that has not been able to keep up with its rapid growth and, as a result, has neglected the installed base. In a series of memos posted on Usenet, users related such experiences as waiting four weeks to get the price and part number of a tape controller, forbidding certain Sun field engineers to touch their equipment because they had such poor experience with service and the repeated failure of field offices to return telephone calls.

"I think it's fair to say that product demand has outstripped our ability to keep up with it," said Robert Lux, vice-president of customer support at Sun. "The image was accurate, but we're quickly getting control of it. We're not experiencing any problems that any other fast-growth company hasn't experienced."

Lux, who joined Sun after leaving rival company Apollo Computer, Inc. early this year, came on board specifically to improve customer relations. Aware of the Usenet complaints, Lux said that Sun has taken great strides since that time, and many users agree with him.

"We're going through a good period with Sun now," said Tom Wadlow, a systems engineer at the Schlumberger Palo Alto Computer Aided Systems Laboratory. "They have fluctuated. I've had really good and very bad experiences with them. There have been times when we scream our heads off and then things get better."

Another West Coast user, who requested anonymity, said he was angered by the Usenet comments because "Sun is having normal growing pains, and we've had worse experiences with other vendors."

"When we complained and made a big deal, they came through," said Erik Freed, systems development engineer at Aurora Systems, Inc. in San Francisco. "I guess that shows the difference between a busy company and one that does bad business."

Aurora Systems makes video graphics systems based on Sun processors for the broadcast industry. On the Usenet in February, Freed

See **USERS** page 30

Battles in the super market

From page 29

adding vector processors to IBM 3090 mainframes. Young companies such as Sequent Computer Systems, Inc., Elxsi Co. and Convex Computer Corp. have tried to grab the low-end portion of the supercomputer market with minisupercomputers and near-supercomputers.

Established vendors such as Intel Corp., Floating Point Systems, Inc. and BBN Advanced Systems, Inc. have tried to bracket Cray with massively parallel or cube-architecture machines that they claim can provide anywhere from entry-level to greater-than-a-Cray performance.

But now Cray and CDC, with a smaller user base served by its ETA Systems, Inc. spin-off, are facing a new challenge, a threat that seemingly had been more talk than reality for so long. Japanese vendors are finally focusing on the U.S. supercomputer market after years of industry speculation about how powerful Japanese computers would be when they were built and how soon they would hit the U.S. market.

Well, Amdahl Corp. is reportedly almost ready to announce its first U.S. sale of a Fujitsu, Ltd.-built supercomputer after selling four Fujitsu systems in Europe, and NEC Corp. of Tokyo has announced its first U.S. sale to the Houston Area Research Center. In addition, NEC and Honeywell, Inc. have reached agreement on a joint venture to market NEC SX-1 and SX-2 systems in the U.S. and Canada.

NEC, Fujitsu and Hitachi, Ltd. have long boasted that their supercomputers will outperform Cray systems, with Fujitsu and Hitachi claiming the added benefit of being IBM compatible. Now the speculation apparently can be brought to a close. It will be interesting to see what happens when enough of the Japanese systems are installed to allow side-by-side benchmark comparisons, rather than relying upon observers scurrying about the globe to catch a glimpse of the competitors.

Then it will be still more interesting to see whether, a few years from now, those Japanese companies and the U.S. vendors promoting new architectures can start to dent Cray's market dominance, and whether the people paying the tab can benefit from the renewed competition.

Users warm up to Sun's services

From page 29

said that Sun had not informed him that it had rescheduled an important delivery. Then in June, Freed said that Sun was behind schedule in shipping the CPU boards but that it was not yet a problem because Aurora had not stepped up its own production. In July, Freed said, "Things are coming in fast enough now."

In an interview in early June, Plotnick of Bell Labs said he had been promised an on-site maintenance person since late 1984 and that Sun had yet to provide such a person. At that time, he said, his so-called on-site maintenance consisted of "someone who would show up at no guaranteed time" when a problem was reported.

"It usually takes several days to get someone out here," he said in June. "Then we have to wait for the parts they order. And then wait for them to come back again."

> ***"Of the many suggestions this group received, two of the major user concerns were better delivery schedules and better installation services."***

However, in an interview this month, Plotnick said the on-site maintenance person "was brought in a few weeks ago," and that he is "fairly satisified with Sun right now."

Lux said he organized a task force at Sun that visited customer sites during April and May to find out what the real problems were. Of the many suggestions this group received, Lux said two of the major user concerns were better delivery schedules and better installation services.

Lux said Sun is committed to providing products in a timely fashion. He added that a new manufacturing facility in Milpitas, Calif., will double the capacity of Sun's current facility in Mountain View, Calif. The Milpitas facility is expected to ship a nominal amount of products soon, and eventually, it will replace the Mountain View facility, which Lux said is "not very sophisticated." That plant will be converted to office space.

The company has also doubled the size of its U.S. service organization in the past six months and plans to triple it by year's end, according to Lux. Although he would not provide specific numbers on the U.S. service group, he said the company had 150 service employees worldwide before it began increasing the ranks.

Donald Mosley, systems support technician at Washburn Direct Marketing in Charlotte, N.C., is another user that has seen improvements. "We haven't had any problems lately," he said. "We've had a few hardware questions that they did answer promptly. We seem to be able to get answers more quickly from them than we used to."

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Multiple session management.
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Centronics in the laser mart

From page 29

module is optional. Resolution is 300 by 300 dot/in. The printer emulates Diablo Systems, Inc. 630 and 630 ECS printers, Epson America, Inc.'s Epson FX printer and IBM's PC Graphics printer and Proprinter.

According to industry observers, Centronics is the only manufacturer other than Sharp to use Sharp's print engine.

Analyst Charles Lecompte of Datek Information Services, Inc. said the laser printer appeared to be comparable in price and performance to other laser printers in its class.

But he noted that he was surprised that the Pageprinter 8 handles only 100 sheets of paper at a time, which has been a user complaint about competing machines based on a Canon U.S.A., Inc. print engine.

Centronics also announced its TX line of printers, which includes seven existing Centronics models adapted for use with the System/34, 36 and 38.

The adaptation for the Printstation 250, 260, 353 and 358 printers and Linewriter 400, 855 and 1200 band printers consists of adding twin-axial interfaces.

The low-end dot matrix printers announced at the same time are the Printstation 210 and Printstation 220, which are said to perform at 180 char./sec. in draft mode and 45 char./sec. in near-letter-quality mode.

The two printers reportedly share parts commonality in major modules.

The difference between the two is that the 220 prints 136 columns, and the 210 prints 110 columns. The 210 costs $499, and the 220 costs $599.

The company also announced its Preferred Reseller Support Program, which officials described as a one-stop, single-vendor solution for a reseller's printer needs. The program includes inventory management, customer service, hot line assistance, volume discounts and promotional support.

Apollo tools prepackaged

From page 29

tape drive. The package includes five software tools, documentation and two compilers from a choice of C, Fortran or Pascal.

The hardware and associated software would regularly sell for $100,760, Pomper said.

Four of the software tools — a debugger, an interface developer, an electronic mail function and a communication tool that coordinates work among a team of developers — are offered with five licenses each. Likewise, each of the two compilers will have five licenses. Apollo will provide a site license, which covers up to 100 users, for its Domain/Pak, a recently introduced performance analysis tool kit.

The CASE Project Pack, which comes with 10 Series 3000s, sells for $159,900. It has five 72M-byte disks and a 60M-byte cartridge tape drive. It includes a site license for all of the associated software, which is the same software provided with the Starter Pack.

The CASE Server Pack, which costs $192,900, is the same package as the Project Pack, except for the additional Domain File Server with 500M-byte disk drive.

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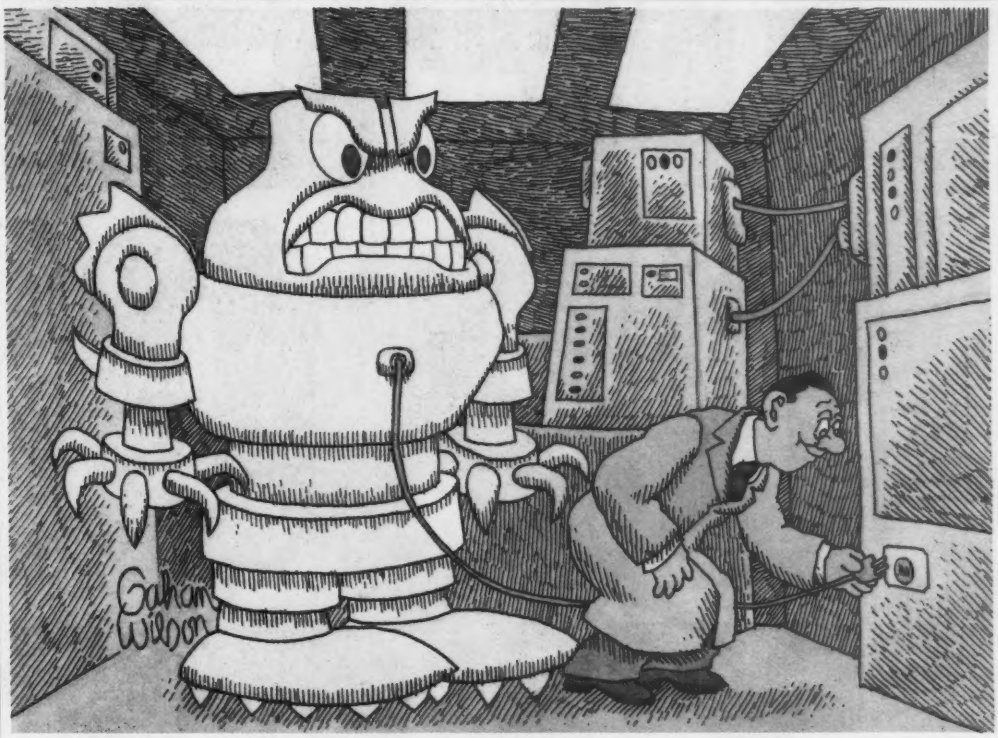

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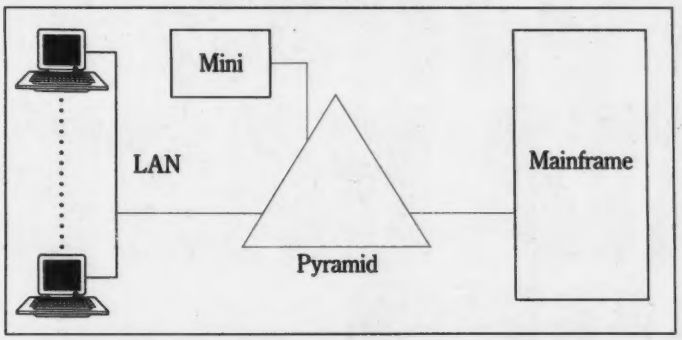

It's clear that connectivity is the answer. But it's also clear that just connecting computers isn't enough. They have to be able to communicate throughout your system in an open, unobstructed way. That's the kind of connectivity a Pyramid supermini can give you.

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Our I/O processors free up the CPU while keeping terminals and disks responsive. So users see nothing but performance, yet there's no overhead to the rest of the system.

Finally, our dualPort™ OSx operating system makes both UNIX® standards (Berkeley 4.2BSD and AT&T's System V) available concurrently. Making the broadest possible choice of software and vendors available as well, while protecting your own software investment.

And because some of our systems never get turned off, we offer 24-hour service and support. Plus extensive training on both hardware and software to insure our customers never get turned off, either.

This combination of features and openness makes our systems ideally suited for three important applications: As data base servers, pc/workstation servers, or software development environments. We'll talk about each one of these applications at length in a series of advertisements.

In the meantime, to learn more about Pyramid systems and the company behind them, contact us at 1295 Charleston Road, P.O. Box 7295, Mountain View, CA 94039-7295. Or call 1-415-965-7200, Ext. 3450.

We'd be very open to hearing from you.

PYRAMID TECHNOLOGY

The Shape of Performance.

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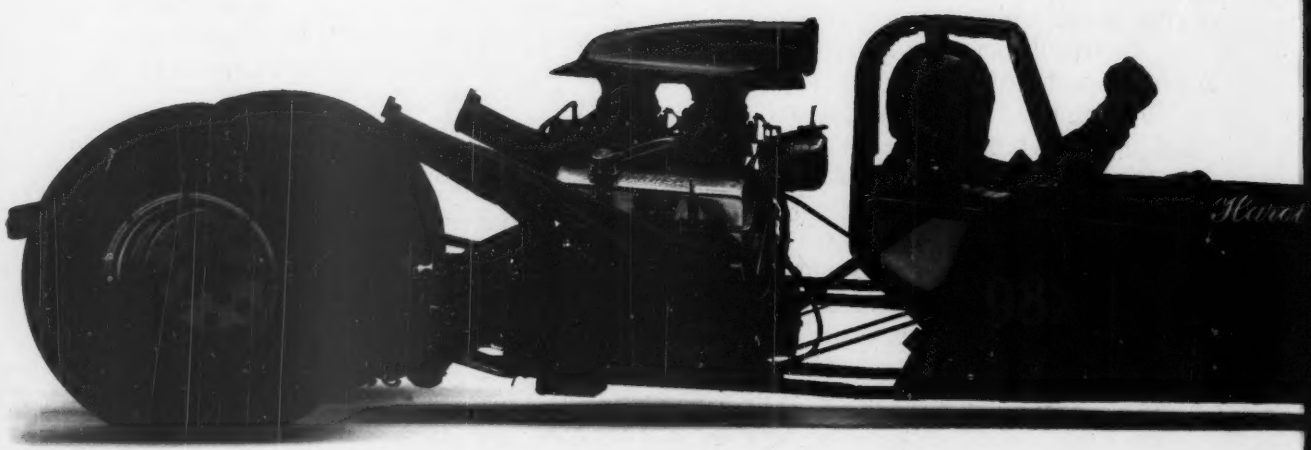
GUESS WHO WINS THE DATA BASE RACE?



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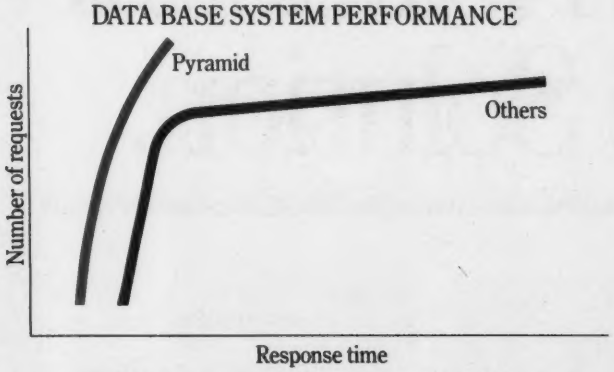

Other superminis have a very pronounced "knee" in their curve. That's where their I/O subsystems hit the wall. But not Pyramid. Thanks to our distributed processor architecture, we deliver crowd-pleasing performance. For as little as 2/3 the cost of our competitors' systems.

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We also have processors for everything that needs one. Namely, the disks, the terminals, and any attached networks. That means the peripherals always have a green light, and the CPU can go its own way.

And our XTEND™ bus is the ultimate in handling. With an advanced cacheing scheme and a message-based, 40 Mb/S bandwidth, it's no wonder.

But performance isn't the only thing we offer.

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We have strong relationships with every major relational data base manufacturer. So not only will you have a choice of what to run, you'll get support from both us and them. No matter who "them" is.

And since Pyramid systems are open systems, built on widely-supported industry standards, we can give you more different ways to go. Without locking you in. Or locking your other suppliers out. Chances are, they support the same standards. Like UNIX,® for instance.

It's that wide openness that'll have everybody cheering, including you, because a Pyramid can give more people more data base access. From individual users on pc's, workstations or terminals, to departmental micros and super-minis, to mainframes running batch, transaction processing, or scientific applications.

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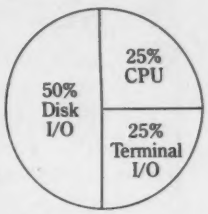

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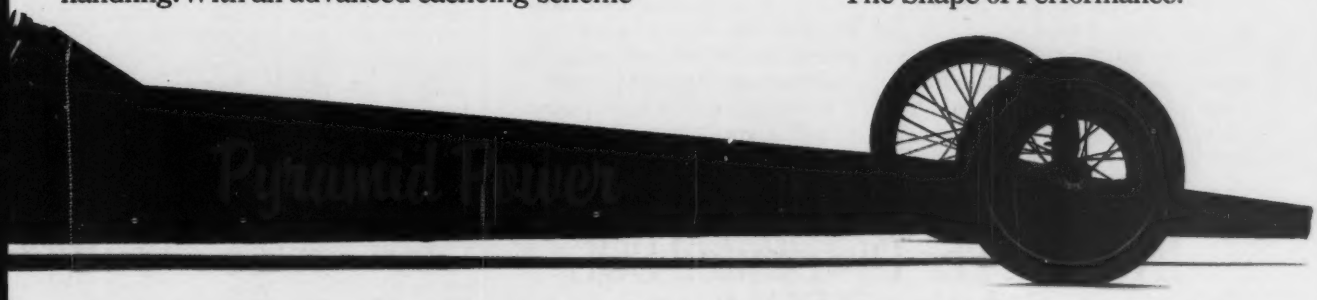

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	Newton	Dec 4
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		Dec 9
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MICROCOMPUTERS

MICRO BITS
Eric Bender

What's Best just might be

Unlike most personal computer software, General Optimization, Inc.'s What's Best spreadsheet optimization software often explicitly cost-justifies itself, churning out figures on bottom-line savings. And those savings can make the package's cost almost irrelevant, users say.

Carol Ronan, now vice-president of the public finance division at First National Bank of Chicago, used General Optimization's package at a former job to handle debt restructuring. What's Best saved one hospital more than $1.5 million, she estimated.

Introduced quietly last fall, What's Best has become the first linear programming micro package to gain widespread recognition. Running concurrently with Lotus Development Corp.'s 1-2-3 or Symphony, the software shows a familiar 1-2-3-style screen and lets users solve optimization problems — such as "What's the best schedule for this staff?" or "What's the optimum mix of these products?"

In Ronan's case, the package gave the bankers better ways to deal with arbitrage limitations on debt restructing, she said. "We had been doing this kind of restructuring on a trial-and-error basis, spending a lot of hours finding an appropriate mix between taxable and tax-exempt borrowing. . . . The markets move too quickly; we didn't have time to spend 80 or 100 hours guessing."

Linear programming software that could handle this kind of problem has been available on larger systems for years, but that was not really an option for her. "Linear programming on a mainframe was way too complicated," Ronan said; she doubted that suitable staff support would have been available.

See **WHAT'S** page 40

Bender is East Coast editor for PC World.

Quadram focuses on optical mart with video data bases

By Douglas Barney

NORCROSS, Ga. — By late summer, Quadram Corp. will ship Quadvision, its entry into the fledgling video data base systems market.

The system will consist of a compact disk/read-only memory (CD-ROM) player, a laser disk, personal computer hardware and software that will allow firms to build video data bases that provide customers with visual and text information such as catalogs, product availability and demonstrations.

The product is the result of a joint effort with software developer Comsell, Inc. of Atlanta and will be sold mainly to firms such as hardware store chains to replace stacks of product catalogs.

"The customer type will be a manufacturer or product distributor who will engage his dealer network or customer network in the purchase of these systems at every location so there is a common medium for distributing the information," said Ben Dyer, president of Comsell. "It provides a very effective alternative to print."

"This is a wildly neat way to tie two businesses together, such as manufacturers to wholesaler or wholesaler to retailer," said Bob Brown, president of Quadram.

The system will sell in quantities for $5,000 to $7,000 and includes a hard disk-based personal computer developed by Quadram. "The hardware is an IBM Personal Computer-compatible base built on our Datavue portable computer's components. The unit is about the size of a Xerox Corp. machine," Brown said. In addition to its video capabilities, the computer will run IBM-compatible applications software. CD-ROM and laser disk suppliers have not been finalized, Brown said.

"The software allows you to create a video data base that allows you to access either the text that is on the CD-ROM player or the videos, be they stills or moving videos, on the laser disk," Brown said.

See **QUADRAM** page 38

Easybusiness tools, support programs woo micro managers

By Peggy Watt and Douglas Barney

SAN JOSE, Calif. — Computer Associates International, Inc. today announced a new Job Costing module for its Easybusiness Systems Plus Series of accounting software, and enhanced its Easybusiness Systems Payroll module.

The firm is also targeting the corporate microcomputer manager with aggressive deals that promote the company's maintenance and support programs as much as its products.

In addition to the $595 Job Costing module, enhancements to the Easybusiness line involve the ability to highlight important information; Exchange, a facility for importing and exporting data between microcomputer applications; and an automatic printer selector that simplifies the setup of printers. The new products will

See **SUPPORT** page 38

Portable drive moves PC files

By David Bright

NORTH HOLLYWOOD, Calif. — Microcomputer Memories, Inc. has repackaged its Transpac internal 3½-in. Winchester disk drive subsystem into a self-contained, externally attached portable with the same name. Microcomputer Memories expects the subsystem to be used for moving files between IBM Personal Computers, upgrading existing systems, making backups and providing security.

Measuring only 2.6- by 4.15- by 5.9-in., the Transpac comes in preformatted 10M-byte and 20M-byte models priced at $595 and $895, respectively. The Transpac runs off the host computer's power supply. When the unit is attached to a system that already has a hard disk, it automatically becomes either the C or D drive.

According to Marketing Vice-President Rick Eirich, transporting the Transpac is easier than using floppy disks or disk cartridges to move Winchester hard-disk data

See **PORTABLE** page 40

NEW THIS WEEK

- Significant Statistics enhances statistical software for IBM PC and compatibles
- For more on this and other new products, see pp. 81-85.

INSTANT ANALYSIS

"It makes me feel like a Scrooge."
— Ralph Ianuzzi Sr., show director for PC Expo, on kicking children out of the show that is restricted to corporate buyers of PCs and related products

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Support programs woo managers

From page 37

be available this month, said Alan Wortman, product manager for Easybusiness.

The Payroll module has been enhanced to handle up to 21,000 employees and can handle more types of taxes and pay rates, Wortman said.

Computer Associates' two-month promotion, launched earlier this month, offers Supercalc4 free with the purchase of a $150, one-year maintenance program, according to a Computer Associates spokeswoman. Volume purchase rates bring the price down to $89 for 25 copies. Corporate site licensing is also available.

The maker of Supercalc and Superproject also expects to establish a formal corporate advisory panel by the end of the year, Nancy Twomey, marketing manager, said.

"We're not in the feature wars anymore," said Michael K. Crosno, vice-president for marketing. "Customers are certainly looking for a baseline of products, but they're looking for support and standards and control."

The maintenance program includes a technical support hot line, 24-hour service for corporate licensees and such upgrade delivery options as electronic distribution and overnight mail service. Optional benefits include training programs and access to a users' electronic bulletin board. Upgrades are free during the program's one-year renewable term, and Computer Associates typically releases a product update yearly.

The special promotion is also aimed at users of other spreadsheets who can trade in their current programs for Supercalc. It also carries a 15-day, money-back guarantee. First mailings are going to 5,000 microcomputer managers, Twomey said.

"Our corporate strategy is not to be first, but maybe second or third. We're close to first from the timing, but we take more time to make a better solution," Crosno said.

Maintenance plans are also available for the project management software program, Superplan, but feature wars are still raging in that market, he added. "That's a very narrowed group of users," he said. "We are not finding corporations standardizing on project management software."

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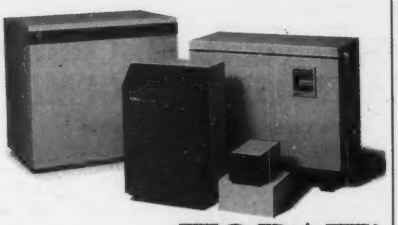

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Quadram focuses on optical mart

From page 37

The mastering of disks is the most expensive aspect of the system. According to Dyer, putting video information on 50,000 products onto a laser disk costs some $150,000. The reproduction of the disks is only some $20, he added. Because of the cost, the mastered disks will be used on a number of systems.

"All a person has to do to get into the business is to bring in a cardboard box full of their stuff, and we will put it together for them and supply the hardware to do the job," Brown said.

Firms interested in the product can bring materials such as advertising, catalogs and order sheets, and have them put onto the laser and CD-ROM disks. Under the joint marketing agreement, Comsell will master the disks for customers.

Expert system financial tool out for small business

By Eddy Goldberg

SALT LAKE CITY — Sterling Wentworth Corp. has announced the August release of Businessplan, a tool for financial planners serving small-business owners and self-employed professionals.

Businessplan draws on the expertise of James Jenkins, financial planner and company founder and chairman. Jenkins' expertise has been supplemented by feedback drawn from the approximately 500 clients who use the company's Planman product, according to Rick Farr, marketing vice-president.

Jenkins' expertise has been incorporated into Businessplan in the form of 7,500 decision rules (If-Then statements). In addition, the system contains about 500 parameters that can be adjusted to allow a financial planner to tailor the product to his own philosophy and style.

Working with the information provided by the client and the planner, Businessplan will produce recommendations in areas such as risk management, pension planning, income tax planning, employee benefits and, in addition, will review a business' finances. "We've gone from the problems of the real world and built backwards to expert systems," said company President Gary Williams.

Priced at $4,500, Businessplan will be marketed to financial planners, accounting firms, insurance companies, brokers and banks that serve small-business owners, Williams said.

Businessplan will run on an IBM Personal Computer with a hard disk, a Personal Computer XT, AT and compatibles with 512K bytes or more of internal memory and with Microsoft MS-DOS Version 2.0 or higher. According to Sterling Wentworth, it requires 4M bytes of disk memory, and the company recommends a hard disk with a minimum 10M-byte capacity.

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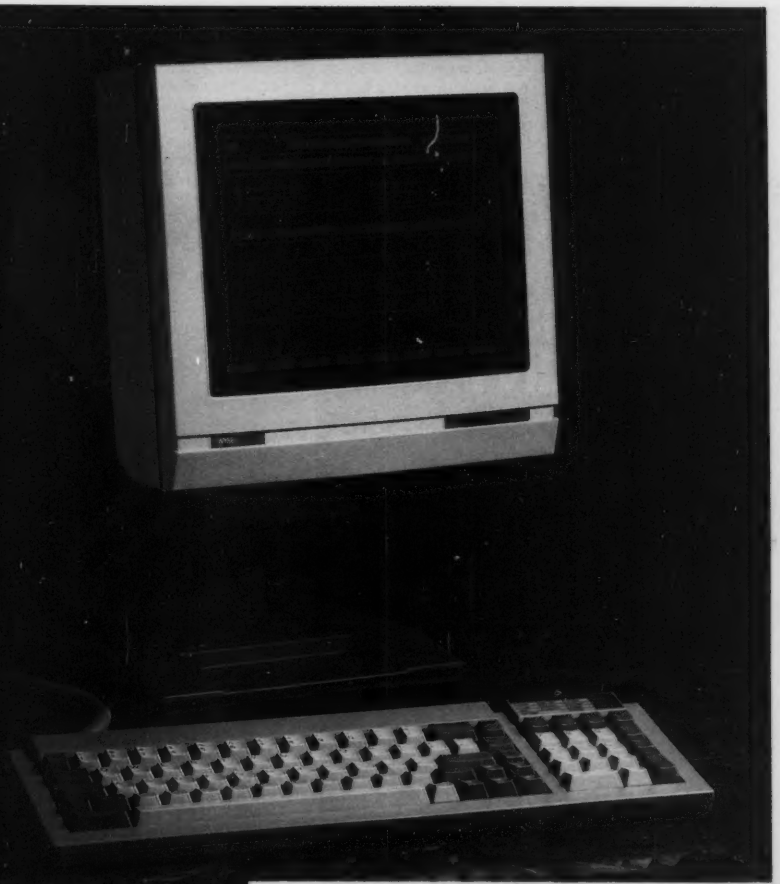

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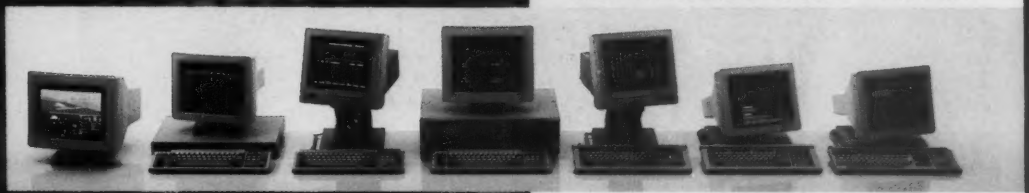

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What's Best just might be

From page 37

Brad Hall, a group controller at an integrated petroleum company that does run linear programming software on mainframes, emphasized What's Best's ease of use and the familiar 1-2-3 screens. "It's important to be able to set up the model itself in Lotus rather than use the complex model generation you find on mainframes. . . . It's just a much more flexible tool than any of the mainframe modeling tools I've seen."

Hall described one exercise in optimizing a shipment of coal. The total bill for an IBM Personal Computer AT clone, software and printer came to $6,000 or less. But the coal-blending exercise "would have saved us over $10,000, and we have 50 of those a year," he said.

Richard Ridington of Soft Industries Corp., a consulting and training outfit in Southington, Conn., is employing What's Best to cut costs for a sausage-making company. He pointed out that such optimization tasks are typically repetitive, high-volume situations and that if they can be handled, their costs are likely to represent only "a drop in the bucket."

"We have found it to be an enormously helpful tool," said John Pacholick, president of Chicago-based Illinois Corp., the largest office in the Rollins, Burdick, Hunter Co. insurance system. "It gives our account executives some good news when they go out to talk to a client."

In today's bleak insurance climate, "clients are traumatized a bit," Pacholick said. His firm employs What's Best to find innovative ways to cut insurance costs by lowering clients' overall cost of business. "Nobody had ever looked at payroll, which is the largest factor in workers' compensation," Pacholick said. Additionally, "we're working with some clients to better optimize inventory costs and transportation costs."

Like many people with MBAs who briefly studied linear programming in school, Pacholick had not considered exploiting the technology afterwards. But "putting linear programming into Lotus all of a sudden made a great deal of sense to me," he said.

What's Best also sells to those who are not so familiar with Lotus products. "We were all just learning 1-2-3 at the time," Ronan recalled. "None of us are programmers; we're all bankers. The only drawback was that we did have to figure it out using macros and such in Lotus."

The software was generally praised for ease of learning and use, although some pointed to a need to understand the underlying problem-solving techniques.

"I found no bugs whatsoever," Hall said. "It really is a user-friendly program; you don't have to be a technician to use it. . . . I thought the documentation was very good, although I would have liked to have a little more detail on the theory of linear programming."

"It's extremely powerful, but there's still a substantial learning curve," Ridington commented. "You have to understand linear programming to a certain degree; that's more than what's required to run a spreadsheet. For example, formulas must be linear. If a nonlinear formula is included, What's Best will detect it and abort — but how many people know what a nonlinear formula is?"

Bumping into software barriers

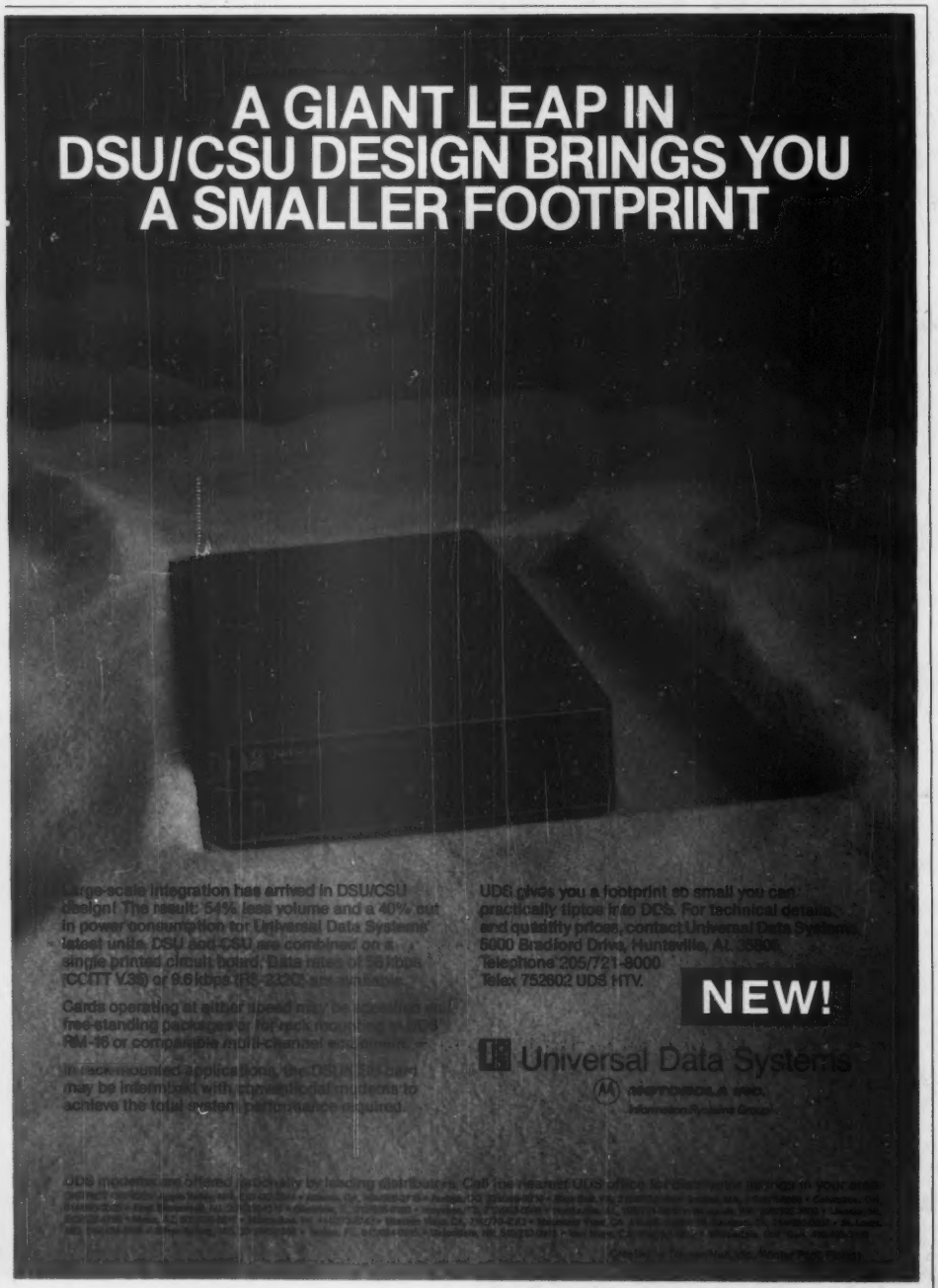
Working on one highly complex What's Best model that optimizes distribution of refinery products from about 200 locations, Hall began bumping into some software barriers. "The total model has about 15,000 cells, and What's Best is limited to 8,000 cells," he noted.

However, not all 15,000 cells were used in the optimization itself, so the problem was overcome through 1-2-3 macros that made calculations and then read results into another file. Even so, it took two hours to run — a requirement "which kind of blew General Optimization away," Hall noted.

General Optimization got high marks for support. "They're very willing to work with you," Ridington remarked.

The most common user suggestion was for additional consulting services from the supplier. "I'd like to see them having several people dreaming up new financial applications full time," Ronan said.

General Optimization offers four versions of What's Best, ranging from a $49.95 education version to a $995 version that needs 640K bytes of memory and handles spreadsheets with up to 4,000 variable cells.



Portable drives moves PC files

From page 37

between systems. When data security is required, the subsystem can be unplugged from the personal computer and locked in a safe place.

While the Transpac has an average access time of 65 msec, Eirich claims its average track-to-track access time of 6 msec makes it one of the fastest backup devices available.

Eirich said there was not much demand for the internally mounted version of the Transpac because many people did not want to open their PC cases to mount the drive, and several IBM PC-compatible systems simply do not have enough room inside. "The reaction told us that it needed to be external," he said.

The Transpac comes with a bus extender board, cabling and a travel case.

Executive Report

Edited by Janet Fiderio and Becky Batcha

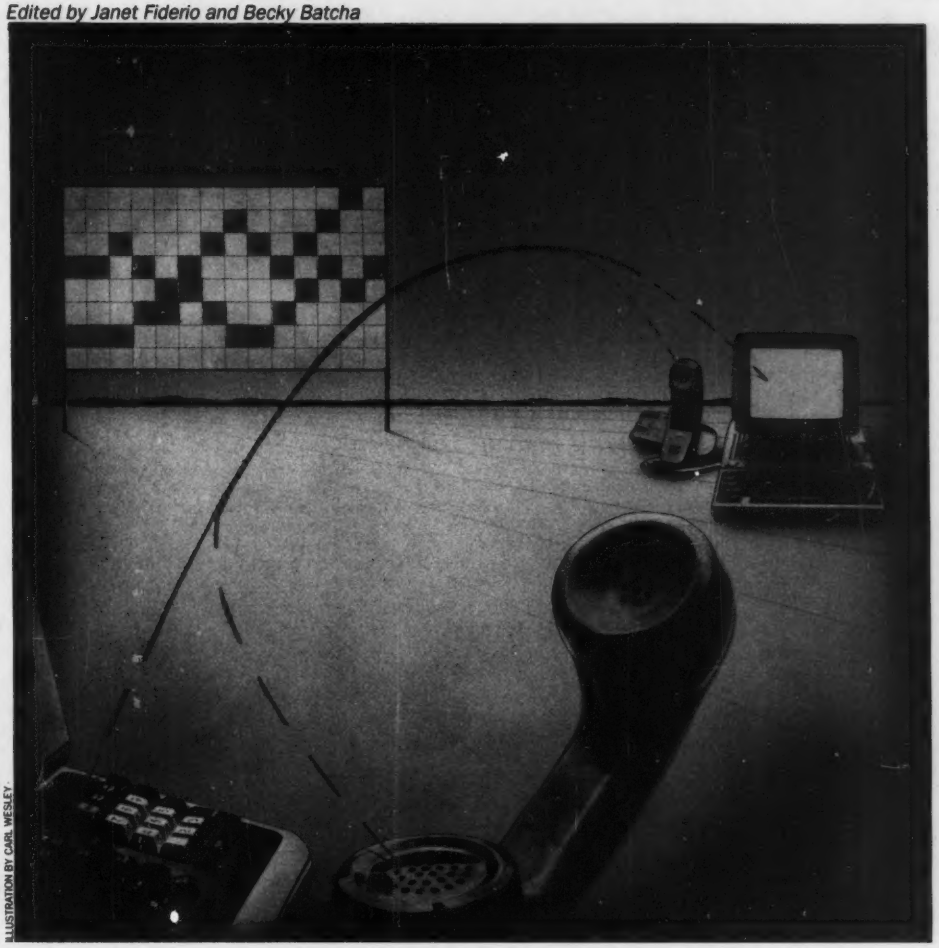


ILLUSTRATION BY CARL WESLEY

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Voice/data PBXs

MIS asks: Are switches a long-term data strategy?

By JOHANNA AMBROSIO

Hedging their bets against the private branch exchange's expansion into data territory, more and more MIS managers are seeing to it that their voice switches at least embody the potential to handle data — even if their corporations do not use that capability just yet.

Estimates suggest that approximately 20% of the country's largest companies use their PBXs to switch some, though not all, of their data. The more data-intensive the organization, the more likely it is to switch data through its PBX. Banks and research organizations, for example, tend to log heavy use.

One user that switches a healthy portion of data through its PBX is Bergen Brunswig Corp. in Orange, Calif. The firm distributes medical and surgical supplies and health and beauty aids to pharmacies throughout the U.S. Bergen Brunswig employes some 3,500 people, about 600 at corporate headquarters.

The company's Rolm Corp. CBX Model II operates in the Orange facility, an intelligent building that had been wired before the firm moved in, according to Anthony Vallerio, vice-president of information resources.

The building is home to more than 70,000 feet of IBM's cabling scheme. Every office comes outfitted with electrical, phone and computer outlets.

Bergen Brunswig opted for a PBX because of the "flexibility the CBX offered to our casual users," Vallerio says, notably the ability to perform both voice and data functions. He also appreciates the ability to accommodate staff and equipment changes with relative ease.

When workers switch offices or need to upgrade their voice and data equipment, the firm can simply plug the required equipment into a wall; technicians need not lay new wire.

Employees can also retain their extension numbers when they change offices, so the firm's phone

Foward-thinking managers are laying the groundwork for the day when all voice and data traffic may be switched over a PBX. But there's a chance that the day will never arrive.

Ambrosio is a Queens, N.Y.-based free-lance writer specializing in technology and business.

MIS asks: Are switches a good data strategy?

Continued from previous page

directory need not go through constant reprints.

Attached to the CBX are 63 Rolm Cypress terminals and 47 Juniper terminals. Managers and executives use the Cypress units, which are display screens with a phone and keyboard. They include features such as autodial, a clock, a calendar and a private phone directory. Vallerio recently ordered 12 more Cypresses, which he expects to arrive in the next two months.

The Juniper machines are phone handsets attached to an IBM Personal Computer and are used mostly by secretaries. Both the Juniper and the Cypress allow users to hold a phone conversation and bring up information on their displays at the same time.

Vallerio stresses that only Bergen Brunswig's casual users tend to rely on the PBX. "For heads down, heavy usage we have terminals directly connected to [our host]," he says. Some IBM PCs and about 350 terminals are connected to the firm's IBM 3090 host through IBM's Cabling System, bypassing the PBX. "I don't know what I'd buy if I had to run heavy data through the PBX," Vallerio says.

The firm also uses the PBX for modem pooling, so its library and market research departments can access outside data bases. And field workers transmit information from portable computers through the PBX into various workstations.

Vallerio likes the PBX's voice messaging capabilities, which he says turns the switch into a giant answering machine. Some 450 headquarters employees can leave messages for each other through the system.

The messaging system eliminates telephone tag and memo writing and allows workers who are on the road to retrieve messages that come in for them.

Bergen Brunswig is now investigating the possibility of adding a local-area network (LAN) for departmental use. If the firm installs a LAN, it will not switch data through the PBX but will rely on a file server for file and resource sharing.

> ***"The price of a PBX may not be as high as it seems, given the potential long-term savings."***

Analysts sometimes call voice/data PBXs a downtime disaster waiting to happen because of their reliance on a single, master controller; if the switch fails, the entire network goes down with it. But Vallerio says his system has not gone down once since its installation more than a year ago.

He also says that purchasing the PBX was a costly endeavor but insists the move makes sense in the long run. "You need to look at the cost over the life of the building," he explains. "How many times do you throw away your telephone?"

Adding data handling to a PBX is tremendously expensive: Companies pay at least $800 per user — including software and hardware on the terminal and host ends — to add typical data capabilities to a voice PBX. Initial, voice-only PBX installation charges run near $1,000 per telephone port.

Moreover, according to Henry Becker, a senior consultant for Peat, Marwick, Mitchell & Co. in New York, supporting data involves a fixed cost. "You're paying for the network to accommodate something, whether or not it's actually being used," he says. If a terminal hangs off a PBX port, for example, the network must be configured to handle the terminal's data flow whether or not the machine is actually being used.

This wastes capacity that could otherwise be occupied by more telephones. "It's just too darned expensive to occupy a PBX with something that

Continued on page 45

User Profile

Boom or bust, flexible PBX pipeline carries oil firm's erratic voice/data flow

By MICHAEL SULLIVAN-TRAINOR

Only the hardiest of communications managers would ever want to trade places with Rick Tuss. As supervisor of telecommunications for Conoco, Inc., an oil company in Houston, Tuss and his staff have had to rearrange voice and data lines more than 5,000 times in the past year for 2,400 employees.

"That means we've moved everybody more than twice," he says, with nary the slightest trace of fatigue in his voice.

Fluctuating oil prices and other trends require employees at Conoco's headquarters to change their responsibilities with a fair amount of frequency. As the employees switch roles, their communications requirements change. Tuss says an easily rearranged digital private branch exchange provides the most cost-effective way to keep up with the company's voice and data traffic.

"We've had to be extremely flexible, especially in the last year and a half, because Conoco has undergone a great deal of organizational and structural changes," he says.

> ***'The reliability of a PBX is much higher than any of the computing equipment attached to it.'***
>
> — Rick Tuss
> Conoco, Inc.

Ease of maintenance and management — the ability to provide voice and data communications support with one work group and a single cable plant — was the other factor that led Conoco to select Intecom, Inc.'s IBX S/40 PBX two years ago, when the company constructed its headquarters building.

Since then, the PBX has met the firm's data communications requirements and has allowed cost savings through modem pooling and other technical efficiencies. In addition, with the number of changes that the system has undergone, the PBX has more than paid for itself in terms of flexibility.

The setup has produced such impressive results, in fact, that Conoco's computer operations department has approached Tuss' telecommunications department for advice on whether the PBX can support local-area network (LAN) traffic as well. "They see the benefit of being able to use the PBX for moves, adds or changes without the enormous cost of rewiring the coaxial cable," Tuss says.

In its old headquarters building, Conoco had leased a PBX from AT&T Information Systems, and the oil firm considered continuing the arrangement at its new home.

But a careful study showed that buying the Intecom product would prove less expensive and would give Conoco greater control over its communications.

Under the lease arrangement, the company had been paying AT&T for every move, add or change; it received no guarantee that the adjustments could be made promptly.

Under the current arrangement, Tuss' department charges users an average of $76 per change, keeping the money inside the company. Users pay less for changes and receive more certainty that work will get accomplished on time.

Sullivan-Trainor is a Computerworld *senior writer.*

Relying on a single switch like the IBX system has one disadvantage, according to Tuss, but the good outweighs the bad.

"You do have all your communications in one device, and if that fails, you're dead in the water," he says. "But by the same token, the reliability of a PBX is much higher than any of the computing equipment attached to it." He puts his PBX's reliability at 99.9% and says Conoco counts on redundancy to protect itself from the minor chance of failure.

The firm's installation consists of one PBX that handles 3,400 lines, 500 of which carry simultaneous voice and data transmissions. About 2,900 telephones and 500 data devices — including personal computers, dumb terminals and dedicated word processing systems — tie into the PBX. The system switches voice and data simultaneously and carries both synchronous and asynchronous traffic.

Transmission of word processing documents among IBM Displaywriters and dumb terminals constitutes most of the synchronous traffic, but IBM Personal Computer users contribute as well. The PCs' file transfers and peripheral device sharing operations are synchronous communications.

Asynchronous controllers that operate on the system give users access to five Digital Equipment Corp. VAX-11/750s and 11/785s in Houston and to two Control Data Corp. Cyber processors and a newly installed Cray, Inc. X-MP computer at Conoco's central computer department in Ponca City, Okla.

To expand the installation's networking capabilities and ensure continued vendor support, the company is currently upgrading from the IBX S/40 to the IBX S/80.

Intecom has chosen the S/80 as its flagship product and reportedly plans to provide more support and enhancements for the new system than for the older one.

Conoco plans to bring up its new S/80 by mid-July. In response to the computer operation department's request, Tuss will try to exploit the PBX's data communications capability through Intecom's Lanmark local-area network connection.

Conoco is planning pilot tests of the system both for replacing coaxial cable and for interconnecting with Ethernet.

In addition to the PBX, Conoco's Houston complex supports a number of local-area networks for departmental tasks. The firm considers the LANs a better choice than the PBX for small groups of computers that operate in close proximity and require high-speed data communications. The local-area networks include IBM's Token-Ring and DEC's Decnet, which handles scientific applications. ■

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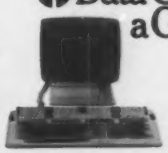

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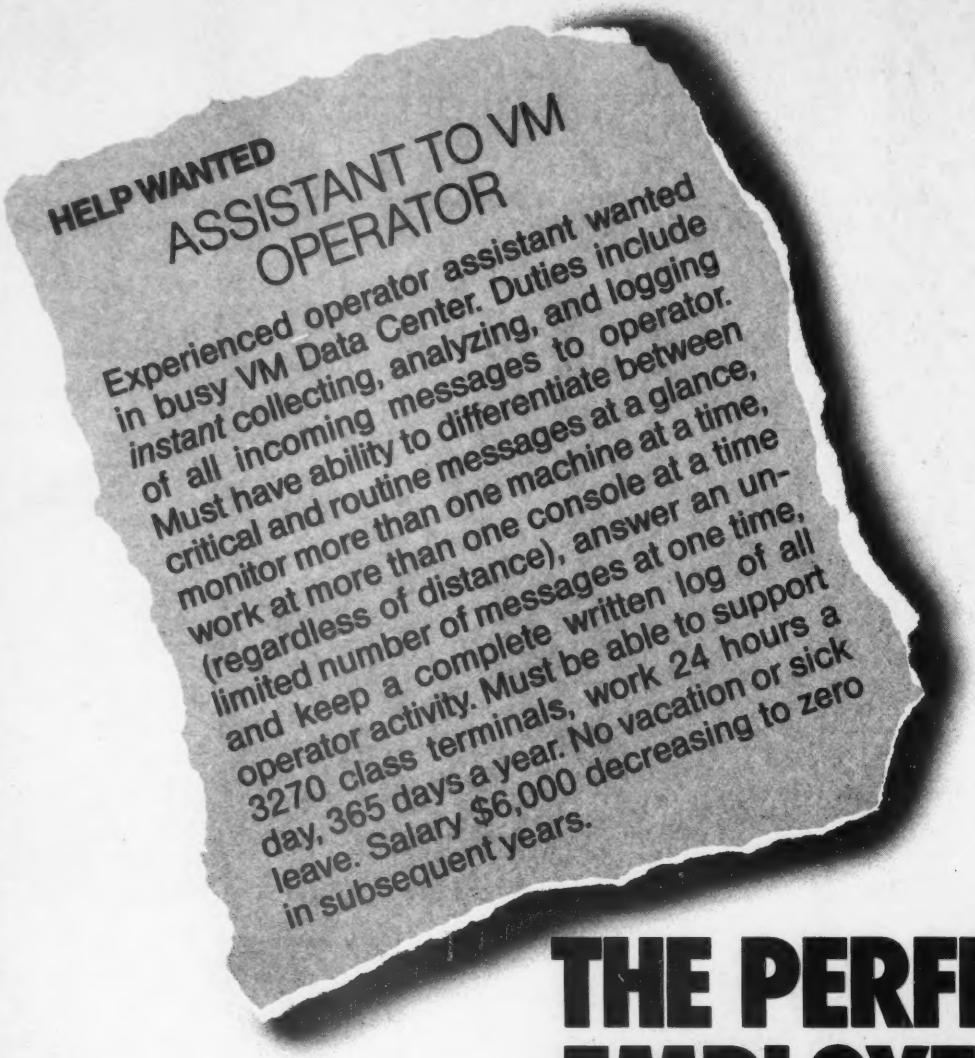
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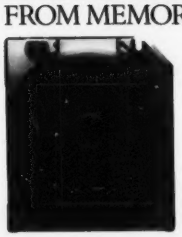

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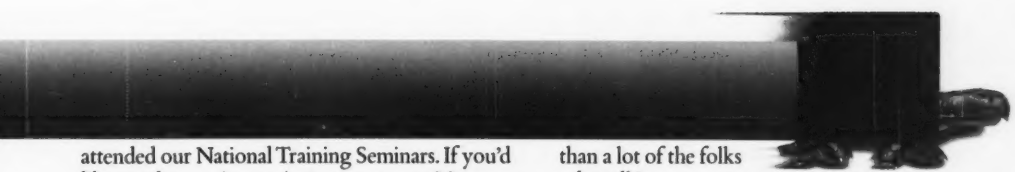

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Continued from page 42

may sit there much of the time," Becker adds.

The price of a PBX system, however, may not be as high as it seems, given the long-term cost savings the system can offer. Some companies, for example, use the wiring from their PBX switch in lieu of more expensive transmission schemes.

They make use of spare wire pairs in their phone lines to link personal computers and other low-speed data devices. By using their PBX systems' existing wiring, the firms eliminate the need to lay costly coaxial cable.

One such user, First Chicago Corp., a financial firm in Chicago, gained a handsome windfall when it decided to go with that approach. "We're saving $1,000 per workstation, because we've eliminated the need for coaxial cable," according to Donald Hollis, First Chicago's executive vice-president.

Twisted-pair wires that the company laid for its AT&T System 85 PBX switch support between 300 and 400 data devices — mainly IBM Personal Computers and 3270 terminals — as well as 10,000 telephones.

> ***'Architecture is the most important decision an end user can make.'***
>
> — Jerry McDowell
> Vanguard Telecommunications

"We're talking big bucks," Hollis says. Beyond the current cost benefit, Hollis sees his voice/data system as a doorway to the future of PBX networking. With the switch and the wires installed and operational, he says, "We're in the position to take advantage of the technology as it becomes available."

Ron Orazine, a senior consultant for Network Systems Design Corp., a consulting firm in Waltham, Mass., recounts another case in which a user firm is looking to take extra advantage of its existing PBX system. The firm, a manufacturer, is hoping to use a spare set of phone wire to support an automatic link between electronic time clocks and corporate payroll records.

He notes that almost every phone cable in every organization contains a set of wire that lies idle yet holds great potential. "That spare set of wire isn't doing anything, so why not use it?" Orazine asks.

Evaluating products: Distinct architectures

MIS managers who need to decide among data-handling PBXs may find themselves puzzled by the apparent lack of diversity. At first glance, the major vendors' products look remarkably alike:

- Virtually all PBXs can switch low-speed data, typically anything under 64K bit/sec., which is generally the internal speed limit of personal computers, terminals and other data devices.
- Additionally, most major PBX vendors' products are designed to accommodate higher speeds when terminal devices demand quicker switching.
- To make matters worse, almost all the major vendors offer identical features — especially for voice. Least-cost routing, call accounting, call forwarding and speed dialing are all commonplace.

Indeed, architecture is about the only distinguishing trait among today's PBX systems. But it is a crucial distinction. "Architecture is the most important decision an end user can make," according to Jerry McDowell, a general partner at Vanguard Telecommunications, a con-

Continued on next page

Revamped Centrex poses formidable challenge to PBXs

By ROSE VALENTA

As advocates of total system ownership and control exalt the benefits of the private branch exchange and other customer premises setups, the regional telephone holding companies are building a sturdy case for the Centrex service. For many users — even small businesses — Centrex offers a viable alternative.

In direct reaction to the challenge posed in the past few years by PBXs, the phone companies have endowed Centrex with some appealing features:

- Centrex now enables companies to rearrange their own stations.
- For a price, the phone companies will provide station message detail recording and advanced automatic route selection.
- One regional phone company even supports local-area networking that is based, as Centrex is, at a phone company's central office (CO).

These capabilities overcome the disadvantages that some users have come to associate with Centrex service: expensive additions, moves and changes; limited automatic route selection; and inadequate data switching capabilities. Centrex's rise from the ashes has put PBX makers and other customer premises equipment (CPE) makers a little on edge, and well it should.

The North American Telecommunications Association (NATA), an industry association for CPE vendors, expects the appeal of enhanced Centrex service to directly cause the loss of more than two million on-premises phone lines — approximately $1.6 billion in sales.

In response, NATA has petitioned the Federal Communications Commission to review the market. The association suspects that the phone companies may be subsidizing low Centrex rates by raising residential phone rates.

The phone companies retort that Centrex service simply outmatches PBX switch technology. They note, for example, that PBXs tend to rely on 20-year-old switching technology while Centrex and other CO services use more modern switches. The argument works to a degree, but customer premises equipment from AT&T Information Systems, Northern Telecom, Inc., Intecom, Inc., Rolm Corp., CXC Corp., Ztel Corp. and other major vendors is typically based on very modern digital switch technology.

Unquestionably, Centrex service does provide a number of outstanding features: 24-hour maintenance, backup power, full processor redundancy and freedom from both the responsibility of allocating floor space and the cost of maintaining an equipment room. Also, when a phone company's CO equipment gets upgraded, the user enjoys the benefits of plant modernization without incurring the capital expense.

Like most PBX systems, Centrex is virtually nonblocking, so traffic will typically flow without interruption. It can accommodate data terminals at speeds up to 4.8K bit/sec. using conventional modems and can also support personal computers, facsimile devices and dedicated word processors using faster, specialized modems.

The AT&T #1A ESS switch that lies at the core of most phone companies' Centrex services is capable of offering users sophisticated features such as switched modem pooling, message desk service and reports about traffic on uniform call distribution facilities.

Enhanced control features that are available through the #1A ESS (including flexible route selection, deluxe automatic route selection and automatic route advance) can provide users with least-cost routing capabilities that rival those featured in modern PBX systems.

Bell Atlantic Corp., one of the seven regional holding companies, even offers a CO-based local-area networking (LAN) feature that allows users to switch data through the central office at speeds ranging from 1,200 to 19.2K bit/sec. CO-LAN service can support communications speeds up to 56K bit/sec. among hosts at the user's site and up to 8M bit/sec. over T1 and fiber links. Most data switching equipment is located at the central office.

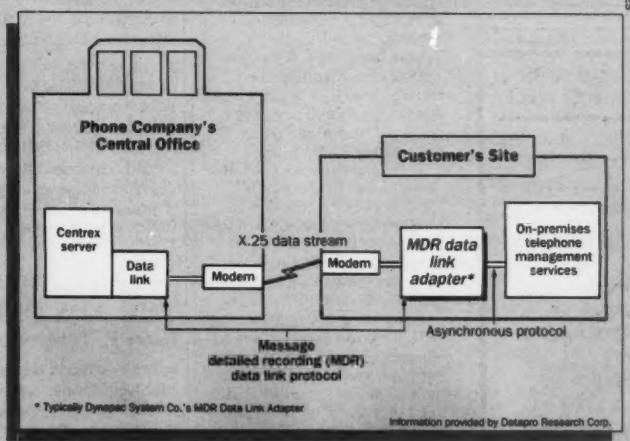
Bell Atlantic targets the service at medium-size and large organizations (businesses and government agencies with at least a few hundred phone lines). Other regional phone companies expect to offer similar capabilities by year end.

Large users can also take advantage of Centrex station message detail recording to premises (SMDR-P) capabilities that rival the reporting capabilities of PBX systems (see chart). To hook in to the service, a firm must buy a protocol converter that costs just over $3,000. Small users typically cannot justify the outlay for SMDR-P.

Although small firms cannot generally afford to get PBX-quality service from their local phone companies, they can obtain Centrex services that rival less-advanced electronic key systems. The phone companies, in fact, offer services designed specifically for users with fewer than 35 phone lines.

Services for small users typically include intercom and call transfer capabilities, three-way conferencing and Touch-Tone service. Speed dialing lists are optional, but they do not match the capacity that users can get with customer premises equipment. ■

CALL ACCOUNTING AND NET OPTIMIZATION COME TO CENTREX SUBSCRIBERS



MITCHELL L. HAYES

A $3,000 protocol converter known as an MDR data link adapter allows Centrex subscribers to take advantage of services that were previously available only to users of PBXs and other customer premises equipment.

Valenta is an associate editor for "Datapro Reports on Telecommunications," an information service published by Datapro Research Corp. of Delran, N.J.

Continued from previous page

sulting firm based in Morristown, N.J. "The architecture determines how easily the PBX handles voice and data and whether or not the switch is redundant."

Generally, a PBX's architecture can be either centralized or distributed:

Centralized PBXs rely on one switch to handle all traffic. The arrangement makes sense for companies that operate out of just one building or out of a few buildings situated near each other. Centralized switches may not be practical, however, for firms that occupy many buildings that lie miles apart.

A few years ago, centralized PBXs presented a problem of system integrity: If the central switch failed, so did the entire network. Vendors of distributed systems chided users of centralized switches for putting all their eggs in one basket. Today, however, most centralized systems come with enough built-in redundancy to prevent total system crashes. Analysts say that a potential centralized switch buyer should ask about redundancy, but they also note that most vendors provide an ample amount.

Decentralized PBXs, on the other hand, parcel out control to a number of decentralized nodes. If one node fails, the others will definitely continue to operate. Distributed switches often suit extremely large office campuses better than centralized switches do.

The three largest PBX vendors — AT&T, Rolm and Northern Telecom, Inc. — all offer both centralized and distributed products. All, moreover, are adding some decentralization to their centralized PBXs in a move toward distributed switching.

Because of the increasingly blurred line between centralized and distributed switches, users should take architectural differences in stride, according to Henry Dortmanf, director of consulting services for the Angus Telemanagement Group, Inc. in Toronto. Dortmanf suggests that users ignore labels and choose their PBX system the same way they would any major purchase: by determining their needs then buying the product that best meets those needs.

Three alternatives to PBX service

User firms that consider the future of voice/data PBXs too risky or the initial capital outlay for a system too hefty may find solace in other options. The most commonly suggested alternatives are Centrex service, data switches and local-area networks (LAN).

Centrex. A practical choice, one to which users have been flocking in droves, is everyone's old favorite: Centrex. The service, left to languish for years, has recently been enhanced by the regional Bell holding companies (see story page 45).

Many phone companies now offer integrated voice/data switching, local-area network connections and systems integration. They also promise to outfit Centrex with interfaces to Integrated Services Digital Networks and to give users faster and faster speeds and higher and higher throughputs. If PBX manufacturers do not keep up with Centrex providers, in fact, they could find themselves rapidly losing market share.

In its most basic form, Centrex is a PBX located at a local phone company's office. Because the phone company maintains the switch, users need not face network management hassles or pay the price of buying PBX equipment outright. Also, when users need additional lines, the phone company — not the user — will accommodate the growth.

However, there are disadvantages. With an in-house PBX, employees can call each other without tying up local lines; with Centrex, they cannot. Centrex users also face limitations on the features they can acquire: They can only get what the phone company offers and cannot shop around for additional capabilities.

> ***A few years ago, centralized PBXs presented a problem of system integrity: If the central switch failed, so did the entire network. Today, however, most centralized systems come with enough built-in redundancy to prevent total system crashes.***

Data switches. A second option is to install a data switch, which — at an average price of $400 per user — costs far less than adding data onto a PBX.

A data switch is generally thought of as a data-only PBX. Because it is less sophisticated, it cannot handle integrated voice and data; users still need to run their voice traffic through a separate, voice-only PBX.

Even though the data switch option forces users to support two distinct networks, it can make good financial sense for users that need to move a lot of data from building to building. "About the only thing I don't like about a data switch," Peat Marwick's Becker says, "is that it's one more box to maintain and program and another vendor in the shop."

Network Systems' Orazine, on the other hand, feels that a voice/data PBX is almost always the better alternative, because it eliminates the costs of installing and maintaining separate networks, hardware and software. Further, PBXs require fewer dedicated ports on a firm's host than data switches do.

Still, he says, data switches offer a sound option for supporting the data needs of power users — for example, engineers and other employees who rely heavily on computer-aided design and manufacturing systems.

Local-area networks. Although some observers have portrayed it as such, the LAN is not a competitor to the PBX. Most large organizations need both — PBXs for switching voice and low-speed data traffic, LANs for connecting office machines.

Even if PBXs someday gain the ability to support high-speed traffic, they will never replace local-area net-

Continued on page 48

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CPI vs. DMI: A rebellion without a cause in the standards arena

By T. DOANE PERRY III

Everyone needs a bit of melodrama to liven things up from time to time, which is why communications industry observers keep tabs on the soap opera struggle between advocates of computer-to-private branch exchange interface (CPI) and digital multiplexed interface (DMI), two PBX interface standards.

Expert's Opinion

IDC's Perry

Right now, the script shows CPI as the hero, because the interface has its roots in the popular 56K bit/sec. world. Digital Equipment Corp. and Northern Telecom, Inc. back CPI.

But the plot also embodies eventual triumph for DMI, because its 64K bit/sec. structure complements the Integrated Services Digital Network (ISDN) standard, rumored to be the future star. AT&T developed DMI with support from Hewlett-Packard Co. and Wang Laboratories, Inc.

Actually, the standards contest is a wash. In real life, there are no raging battles among the interfaces but rather a gradual evolution from one to the other: CPI to DMI to ISDN.

The variety and progression inherent in the evolution provide valuable alternatives for users, who can hang on to equipment until they feel ready to switch over to a new standards environment. This is how the evolution will proceed:

- Throughout the 1980s, CPI will continue to flourish among the installed base of 56K bit/sec. transmission facilities.
- At the same time, DMI will gradually gain strength as users install 64K bit/sec. systems.
- Eventually, both CPI and DMI will coexist. DMI, in fact, should be able to incorporate CPI.
- Later, sometime around 1990, ISDN will provide a useful third signaling alternative.

This movement toward standardization is a slow, steady extension of a 3-year-old effort to promote a common interface. The impetus behind the effort was to strengthen the PBX's data role by lowering the cost of connectivity among PBXs, computers and local-area networks.

Standard interfaces also permit PBXs to switch data from microcomputers or terminals to a host computer over common, inexpensive two-pair telephone wiring.

Proposals for the CPI and DMI standards went before the Electronic Industry Association's standards committee less than one year apart.

Northern Telecom and DEC submitted their proposal for CPI in July 1983. In the fall of 1984, DEC announced the first CPI product. The CPI/32-A, priced at $7,200, is designed for DEC VAX computers that operate under VMS. The CPI interface multiplexes 24 synchronous data channels at speeds up to 56K bit/sec. over twisted-pair wire.

In March 1984, AT&T and Hewlett-Packard challenged CPI by proposing the DMI standard interface. DMI is based on AT&T's System 85 PBX Release 2 hardware and software. It features 23 data channels and one common signaling channel, each supporting speeds of up to 64K bit/sec. A DMI link between the HP 3000 computer and the AT&T Systems 75 and 85 will be available next month for $9,300, including supporting software for the HP 3000.

International Data Corp., a market research firm in Framingham, Mass., predicts that the annual market for DMI interface shipments will grow at a compound annual rate of 65%, expanding from just under 7,000 units this year to about 50,000 in 1990.

Northern Telecom claims to have installed 7,000 CPI interfaces. The firm also plans to support ISDN, however, with chip sets and interfaces from Motorola, Inc.

The danger here is that vendors like Northern Telecom, AT&T and Siemens Communications Systems, Inc. will create slightly different flavors of ISDN. If vendor-specific ISDNs develop, much of the global, dynamic flexibility of the concept will fall by the wayside.

Another danger is that the obsession with the struggle between CPI and DMI will keep industry participants from focusing on more substantial problems.

CPI and DMI are only low-level physical connections. Without higher level software connections — connections at the applications and presentation level — users cannot achieve smooth network integration and cannot employ their systems to accomplish useful work.

Instead of watching the soaps, then, industry figures should concern themselves with the development of higher level links. ■

Perry is the senior telecommunications consultant for communications research programs at International Data Corp., a Framingham, Mass.-based market research firm.

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works; at most, PBXs will act as controllers or gateways to LANs. Vanguard's McDowell sets the matter straight. "A LAN is a series of boxes hooked together through some processing link," he says. "The PBX isn't a transport mechanism; it's a switch."

PBX and LAN vendors have been working for some time to develop interfaces between their products and to computer systems. The following are among the most significant cooperative ventures:

- Wang Laboratories, Inc.'s recent acquisition of Intecom, Inc.
- IBM's purchase of Rolm.
- A joint development agreement between GTE Corp. and Fujitsu Ltd.
- An effort by AT&T Information Systems, Honeywell, Inc., NCR Corp. and Hewlett-Packard Co. to develop interfaces between AT&T's PBXs and the other computer companies' equipment.

Managers who decide to go with the PBX option and buy data add-ons for their voice switches would be well advised to act quickly.

Thanks to heavy competition and a soft market, prices are at an all-time low as vendors undersell their products. "Prices are about as low as they're going to go," says Ernie DeNigris, director of switching systems product management for AT&T Information Systems.

Vanguard's McDowell agrees, but gives users some incentive to wait a little longer. "Prices themselves won't come down," McDowell says. "But features will be far superior. There will be more modularity and support of more management functions."

But Ian Angus, president of the Angus Telemanagement Group, says that prices will drop even further. He sees even better days ahead for PBX buyers. "There are too many vendors in the market," he notes, "and everyone's fighting to stay alive."

The market is in such flux, with vendors struggling to outmatch each others' data capabilities, that potential buyers will have a difficult time pegging which vendors will survive and which will drop out.

Even a strong market presence today does not assure a vendor contin-

Continued on page 50

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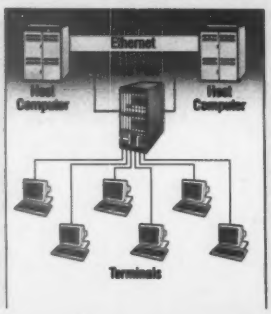

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PBX market stable for now

But what will happen next is anyone's guess

By ROSE MULA

Despite start-up companies' efforts to unseat established leaders, private branch exchange vendors' market shares seem likely to remain utterly stable during the next year, according to industry observers.

"The market isn't really percolating," says Susan Lehto, director of telecommunications for the Yankee Group in Boston. "Activity is rather flat." Still, as vendors struggle to top each other's voice/data capabilities, pressure on the status quo will mount.

Right now, the market looks like this:

- AT&T and Northern Telecom, Inc. command a strong lead over other PBX makers, claiming about 20% of the market apiece. By most analysts' count, AT&T maintains a slight edge.
- Rolm Corp. holds a firm third place, with an 18% to 19% share.
- Mitel Corp. and NEC Telephones, Inc. run about neck and neck for fourth place, at 8% to 10% of the market, followed by Siemens Communications Systems, Inc., GTE Corp. and Harris Corp.

"In general, PBX vendors fall into four categories," says Ian Angus, president of the Angus Telemanagement Group, Inc., a consulting firm in Toronto, "the pacesetters, the contenders, the outside-chancers and the also-rans."

The pacesetters are, of course, AT&T, Northern Telecom and Rolm. Together, they control at least 60% of the market.

The contenders, according to Angus, are Mitel, NEC Telephones and Intecom, Inc. — second-tier firms with strong enough financing, resources and products to challenge one of the big three. Intecom holds a negligible share in the overall PBX market but is strong enough in large-user sales and in voice/data switching to challenge the market leaders in those areas. In addition, Wang Laboratories, Inc.'s recent purchase of Intecom solved the PBX firm's financial problems. The three contenders share about 20% of the total market.

You don't have to be a mathematical genius to figure out that the remaining 20% of the pie needs to be sliced wafer thin if each of the 30+ other manufacturers who supply PBXs to the U.S. is to get a share. Market forces are likely to turn most of the outside-chancers into also-rans within a few years. "It's obvious that the market can't support them all," Angus says.

Some natural boundaries hem the market in. Kenneth Oshman, former president of Rolm, has been known to say that the nice thing about the

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Mula is a free-lance writer based in Waltham, Mass.

PBX business is that everybody needs one — the terrible thing is that everybody needs just one.

At one point, the industry lived primarily on economic growth, supported by the birth of new businesses that needed PBXs. Today, it enjoys a new surge because of a massive technological transformation from analog to digital operations.

But most of the transformations will take place by the end of the decade, and when users reach digital saturation, only slow, natural growth will remain. "That's maybe 6% to 8% a year — not enough to support 35 to 40 companies," Angus notes.

Some manufacturers are therefore carving out specialized niches. Intecom, for example, has captured a healthy share of the market for systems with more than 1,000 users. And Interconnect Planning Corp. has picked up about 80% of Wall Street by custom-designing systems for the financial industry.

David Systems, Inc. is also prospering from niche marketing. The firm sells the David Information Manager, a highly specialized set of peripherals that works with a PBX to provide local-area networking and data transmission. The company sells the product to firms that rely on Centrex and similar analog telephone services but want some voice/data capabilities.

According to the Yankee Group's Lehto, however, niches may not provide a haven for start-ups much longer, because the big guns are beginning to train their sights on specialization.

"Rolm, with its newly announced Redwood system, and AT&T, with its recently introduced System 25, are looming ominously on the horizon," Lehto says. "They're making the small niche marketers very nervous." Rolm markets Redwood to users with between 75 and 100 phone lines, and AT&T has indicated that System 25 will target users with between 75 and 200 lines.

Another survival strategy for PBX vendors is to build strength offshore. Organizations in the U.S. spend about half of the world's telecommunications dollars, but rich markets exist elsewhere.

Angus notes that Mitel, for example, is selling into Great Britain and looking toward Third World nations. Similarly, Northern Telecom sells a good deal of equipment to Asian and Japanese concerns and is launching a major marketing effort in China.

Even these efforts, however, cannot ensure that the large manufacturers will maintain their leading positions. To remain competitive, all PBX vendors will need to offer substantial data processing capabilities within the next two years.

Northern Telecom, for example, needs to develop data processing capabilities or acquire a company that already supplies them, Angus says. "Northern Telecom could do well enough in pure voice, but they would no longer be viewed as a key player."

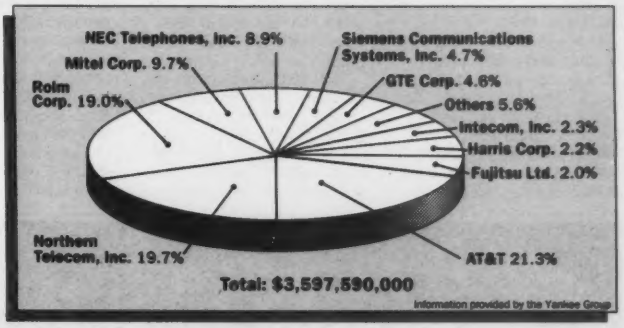
The growing importance of voice/data integration does not bode well for the smaller manufacturers, either. "Many of the smaller companies, including those who claim to have a terrific product, will go out of business," Angus says. "Without an enormous amount of capital, no company — no matter how terrific its product — can survive."

A number of small manufacturers have sprung up recently, especially in Massachusetts, a state that Angus claims is to telephone manufacturers what California is to religions. "Anyone who owns a garage there and can think of a short, snappy name ending in 'X' starts a phone company and announces that he's invented the greatest new architecture since Bell."

Then the entrepreneur finds venture capitalists, who raise $3 million for him, and he thinks he's got it made. But $3 million is nothing, Angus points out. "The big guys throw that much away on memo pads." The best a small company can hope for, he says, is that its technology is good enough to attract a big buyer. ■

MITCHELL J. HAYES

PBX MARKET SHARE: VENDORS' PORTIONS OF A $3.6 BILLION PIE



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MIS likely to control PBX

If newcomers to integrated voice/data private branch exchange networking follow the leaders in the field, MIS departments will wrest control of the corporate PBX from communications groups — but only after some messy, disruptive turf wars.

Within firms that have integrated the management of voice and data, MIS has typically come out on top. Most firms, however, have yet to reach that point.

In theory, many corporations' voice and data managers integrate their efforts. But in practice, the situation is another story altogether, most observers agree. "They still don't talk to each other," says Ian Angus, president of the Angus Telemanagement Group, Inc. in Toronto. "Turf protection is getting in the way of solving problems."

Analysts also agree that the outcome of the current battle will shape the direction of the PBX network. Since MIS seems likely to take control, MIS will probably determine the future of the PBX. Systems professionals will see that the switch eventually functions as a core provider of business applications rather than as a simple voice switch.

Given the responsibility and opportunity that PBXs can bring, MIS managers should take it upon themselves to learn about voice traffic and PBX architectures, Angus suggests, and should try to get involved in any PBX acquisitions that their firms undertake.

— JOHANNA AMBROSIO

Continued from page 48

ued health. "The market is in a transitory stage, so size and present positioning speak only for today," Orazine says. Angus agrees that even users who choose to go with a traditionally stable vendor cannot consider themselves totally safe.

Despite the market's uncertainty, though, most large, forward-looking users have at least laid the groundwork for voice/data PBX functions — just in case network technology should come to center on the PBX switch.

The market will remain unstable for at least five years, according to Orazine, and many users will want to upgrade their switches before the storm settles.

To ease nervous MIS and communications managers, many consultants suggest the following precautions:

- Be as sure as possible that the vendor is a long-term player by ascertaining its market strength.
- Get recommendations from other users.
- Insist on an open architecture that can continue to grow should the vendor go belly up.

An open architecture is one of the most important features for users to look for, according to Orazine. "Make sure the PBX can interface with other vendors' equipment, so you won't be locked in," he says.

Careful preparation now will pay off especially well if the PBX becomes the standard hub of corporate communications. And many observers feel it will.

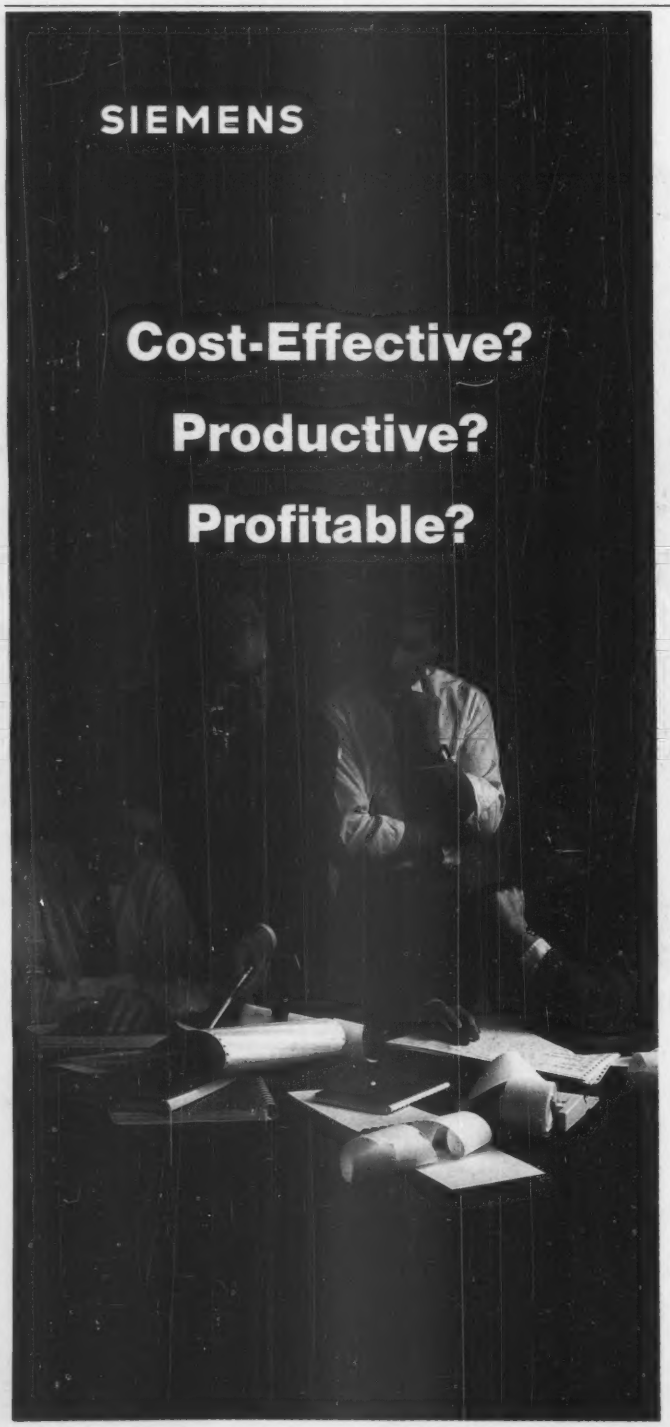
Vanguard's McDowell, for example, expects the PBX to take over as the controller of almost all information that enters, leaves or is routed around a corporation. "In the future, we'll call the PBX an integrated office switch," he says.

In this scenario, the voice/data switch would be just as important to a firm as computers are today. The PBX would assume the role of a giant traffic cop, switching voice, data, text, graphics and video. Users would need to manage and control only one network rather than two, and they could reap the benefits of the ensuing economies of scale.

Other observers, however, look to the future and see a more familiar scene: voice traffic traveling over PBXs, data traffic taking the traditional routes.

"I'm a great fan of technology," Peat Marwick's Becker says, "but I'm pessimistic in this case."

One thing is certain: The PBX has already begun a transition. Where it will end up, no one knows for sure. ■



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In Depth

Paper chase: Keeping up with office productivity

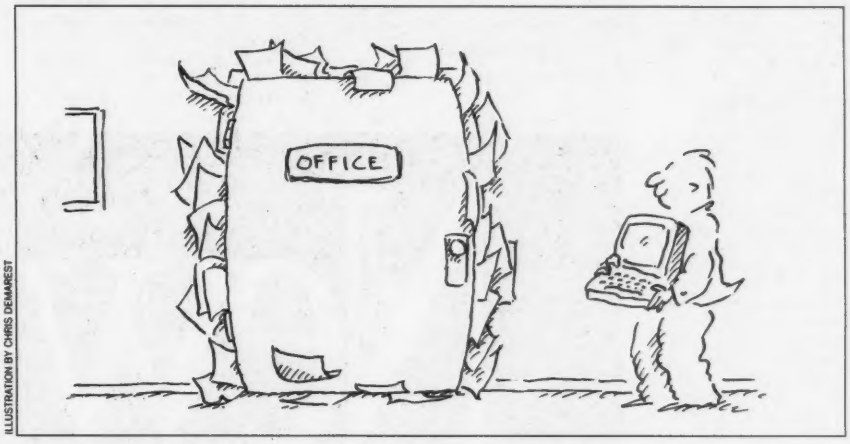

ILLUSTRATION BY CHRIS DEMAREST

A company can compete successfully only if its office workers are properly equipped to use the best available technology to help them do their jobs. Waiting until 1990 — or tomorrow — to start the process may be too late.

By EDWARD YOURDON

There are several major arguments in favor of office automation, all involving different aspects of productivity. For example, we know that office expenses currently account for approximately 25% of the cost of doing business in most companies; by the end of the decade, the figure will rise to approximately 45%. Increasing salaries, a decreasing work ethic and the continuing shift toward a service-oriented, information-based economy make it more and more important to improve the effectiveness and efficiency of office activities.

While industrial productivity increased by 90% in the 1970s, office productivity increased only 4%, and costs doubled. Clearly, there is a need for improved productivity.

Many organizations are also finding it increasingly difficult to hire competent clerical and administrative people, thus making it necessary for the few competent administrators to be more productive and for managers to do more and more activities for themselves.

There once was a time when a manager could dictate a letter, give it to a secretary to type and expect the secretary to spell the words correctly. Now it is more common for the manager to correct the secretary's spelling; indeed, the manager often finds that it is faster if he types the letter himself.

I came to this conclusion several years ago when my secretary asked me if I knew the ZIP code for New Zealand. When I explained, as patiently as I could, that New Zealand was not a state like New Mexico, she looked at me blankly and asked if I knew the area code so that she could call information and get the ZIP code. She has, thankfully, moved on to greener pastures. I have been typing my own letters ever since.

Coping with correspondence and commuting

Letters, unfortunately, suffer another indignity after being mistyped by the modern secretary — the (shudder) post office. There once was a time when the post office was a relevant, useful, important part of society; that time ended, by my reckoning, around 1963. How American business has managed to survive dealing with the post office for the past 20 years is a mystery to me.

Why anyone would willingly use the post office today is an even greater mystery. Electronic mail (E-mail), high-speed communicating printers, intelligent copiers, facsimile copiers and a variety of other telecommunications products make the post office an increasingly irrelevant artifact of society. This is especially true for communications between business organizations (as opposed to communications between business organizations and the retail consumer).

Approximately 75% of business-to-business correspondence consists of documents generated by the sender's computer and processed by the receiver's computer. It is an act of madness to put the post office between those two computers.

Business organizations are also finding that transporting workers from home to office is costing more money. In addition, the commuter transportation infrastructure is getting more overcrowded and closer to collapse in many cities. If it costs an employee $200 a month for a commuter

About the author

Yourdon, chairman of Yourdon, Inc., is author and advisor for the Yourdon Press Computer Series, now published by Prentice-Hall, Inc., Englewood Cliffs, N.J. This article is excerpted from his newest book, Nations at Risk *(Yourdon, 1982).*

train ticket, his employer pays for it, usually in the form of a salary high enough to make the job attractive. And if the train is delayed for an hour every day during the winter season, the employer pays for it, usually in the form of decreased productivity, sometimes in the form of increased absenteeism.

An attractive alternative is telecommuting: Let the employee work at home. To do this requires not only a personal computer in the home but also a companywide infrastructure of electronic mail, telecommunications and other OA technologies.

Office automation will eventually cause a major decline in, if not the ultimate demise of, a time-honored tradition — the business trip. Long-distance travel is becoming more expensive; more important, it is increasingly regarded as a time waster. A businessman often finds that he spends a full day traveling to a meeting and a full day traveling back; this overhead for a one-hour meeting is extremely costly.

Though video teleconferencing technology still has not been accepted by American business, it looms on the horizon as the replacement for the business trip.

There are some important secondary benefits that come with OA. They include the following:

- Reducing "media transformations" — extraneous dictation, converting a rough handwritten document into a typewritten document and so on.
- Reducing "shadow" functions — time wasters that accompany communications-related tasks but contribute nothing to productivity. The information content of a typical intraoffice business telephone conversation, for example, is about 30 seconds, but it is accompanied by about five minutes of social pleasantries with which both parties would often happily dispense.
- Eliminating some functions altogether — for example, the mail room.
- Reducing "information float" — rather than waiting three days for a report to be mailed from a branch office to Galactic Headquarters, electronic mail can move the report in a fraction of a second.

Melody Johnson, an observer of the OA movement and an analyst at Kidder, Peabody& Co., has remarked that "the office of the future will always be in the future." Indeed, our vision of the automated office in 1986 is likely to be very different from our vision in 1990. Much of our 1990 vision will depend on just how much the technology of telecommunications, computer hardware and computer software — especially such things as artificial intelligence — has managed to advance.

Today, OA generally includes — in addition to the standard collection of typewriters, dictation machines, duplicating machines and so on — four computer-based technologies: word processing, electronic mail, electronic filing and video teleconferencing. Exactly which one is most important depends on the nature of the business and the activities of the professional workers (see story next page).

In general, information retrieval seems to be the most common use of OA technology at the present time. A Honeywell, Inc. survey of some 700 knowledge workers in September 1984 found that knowledge workers use office automation technology to communicate with other computer users (43%), for word processing (50%), to analyze numbers or financial information (73%) or to retrieve information from data bases (82%).

> ***Knowledge workers in the U.S. were paid $400 billion in 1979; clerical workers received only $125 billion. It doesn't take a genius to understand that a 15% improvement in managers' productivity would save a lot more money than a 15% improvement in that of their secretaries.***

Word processing

Word processing is the one part of office automation that is widely accepted and reasonably well understood. It is also the OA technology with the least leverage because it is used by clerical workers more than by managers and other highly paid professional workers (the so-called "knowledge workers").

A study by Booz Allen & Hamilton, Inc. concluded that knowledge workers in the U.S. were paid $400 billion in 1979; clerical workers received only $125 billion. It doesn't take a financial genius to understand that a 15% improvement in productivity on the part of managers would save a lot more money than a 15% improvement on the part of secretaries.

Nevertheless, it is the secretaries who have received most of the OA technology so far. The market for simple, clerical word processing systems is 60% saturated already; the market for OA technology for managers and professionals is only 20% saturated. According to Honeywell's survey of office automation trends, 75% of the knowledge worker community has access to word processing, and 95% of those with access use their word processors.

On the other hand, the same survey showed that nearly eight out of

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IRWIN

10 knowledge workers with access to word processing equipment still delegate word processing work to secretaries or assistants.

Electronic mail

Electronic mail is a simple concept, but it represents as important and powerful a form of communication as the telephone. The familiar old telegraph system and its newer cousin, telex, could be regarded as forms of electronic mail, but these relics are not as important as the computer mailbox form of electronic mail. The latter form requires a dumb terminal or personal computer on the sender's desk and receiver's desk; telephone lines link the terminals to a central computer, which can store and forward messages.

Actually, electronic mail (of the computer mailbox variety) has existed since the mid-1960s, when time-sharing and on-line computer systems first began to appear. However, they were generally available only to a small community of end users who had other reasons for using the computer.

For example, airline reservation clerks who accessed the terminal all day long found that in addition to their normal transactions, they could send electronic messages to other airline reservation clerks.

Programmers in an organization's MIS department often had the ability to communicate through terminals in addition to their normal software development activities.

But now the concept is spreading beyond these special interest groups. We are beginning to see organizations in which everyone has access to a computer terminal for sending and receiving messages. Indeed, to really make the concept work properly, a large number of employees need a terminal at home as well as in the office, and there should even be portable terminals for the employees who need to travel away from the office.

Conceptually, there is nothing complicated about electronic mail. The sender simply indicates the name(s) of the person or persons to whom he wants to send a message and then proceeds to type the message itself.

Of course, there are many elaborations upon this basic theme; for example, the sender can create different mailing lists so that messages of one kind will automatically be sent to everyone in the marketing department.

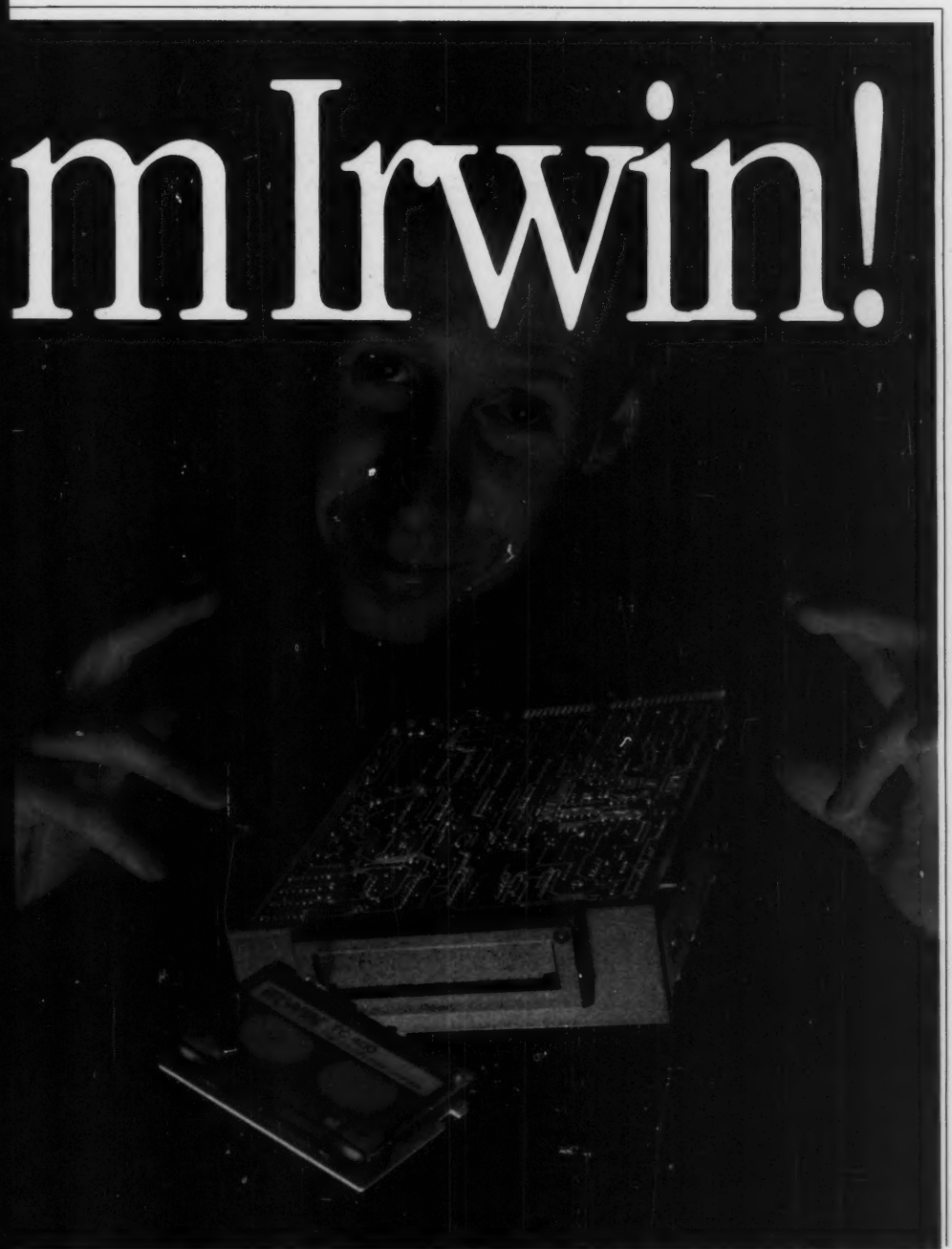
Some electronic mail systems have a return-receipt-requested feature so that the sender can tell exactly when the receiver got the message. And receivers generally have the option of responding immediately to their electronic mail, printing it on paper, rerouting it to someone else, filing it for later retrieval and so on.

A 'cold' medium

Though simple in concept, electronic mail is a fundamentally different kind of communications medium from the telephone. It is, for example, a "cold" medium: The receiver judges whether the sender was in a good mood or a bad mood when he composed his message. The message does not carry the nuances, the facial expressions or the intonations that a verbal, face-to-face conversation carries. Electronic mail sent from the boss to a subordinate at 2 a.m., on the other hand, does carry with it an unspoken message: If the boss is working at 2 a.m., the subordinate thinks, then maybe I should be, too.

Within a single organization, the electronic mail facilities are usually provided by the MIS organization or by an OA group. The computer may be the same one that runs the accounting programs, but it is often a separate machine dedicated to communications.

For business-to-business communications, it is more common to use a commercial E-mail service: General Electric Information Services Co., ITT, Telenet Communications Corp. and MCI Communications Corp. are the better known



Prime targets for automation

Exactly which office automation technology is most important depends on the nature of the business and the activities of the professional workers. Communications consultant Walter Ulrich points out that the average professional worker spends his time in the following ways:

- **1% to 5%: Document creation.** An obvious candidate for word processing.
- **5% to 8%: Thinking, planning, analyzing.** "Outline processor" capabilities of some word processing systems can help, as can spreadsheet programs and other software packages found on personal computers. Doing this work at home — away from the office — can vastly increase the effectiveness of the planning work; electronic mail and home-based personal computing facilities make this feasible.
- **15% to 20%: On the telephone.** This could be shortened with electronic mail.
- **25%: Distributing, filing and retrieving documents.** Electronic mail and electronic filing could help here.
- **40% to 45%: Face-to-face meetings.** These could be more efficient through video teleconferencing and computer-based teleconferencing.

— EDWARD YOURDON

commercial providers currently.

Electronic mail, as described here, is not yet a big business. In comparison with the 500,000 Telex machines that generate $700 million in annual revenue for Western Union Corp. and the 470,000 facsimile transmission machines that generate $650 million in revenue for the telephone companies, there are only 225,000 subscribers — generating less than $150 million in revenue — for the commercial E-mail services. The U.S. Postal Service still dwarfs all of these, with revenue of $24.4 billion in 1983.

However, E-mail's future looks bright, and it is obviously a bandwagon that progressive companies are jumping on. One consulting firm, International Resource Development, Inc., estimates that the $150 million business could grow to $5 billion in annual revenues by 1992. Another firm, International Data Corp., estimates that the number of electronic mailboxes is growing at a rate of 68% annually and that the base of 225,000 mailboxes will increase to more than three million by 1987.

Communications consultant Walter Ulrich believes that the E-mail market is doubling every year and will reach the level of nine billion messages per year by the end of the decade. Another firm, Eastern Management Group, estimates that by the end of 1983, 18% of American businesses had some form of computer-based electronic communications, and another 20% were actively planning for its implementation.

E-mail growth factors

One reason for the rapid growth of E-mail is simple economics. Five years ago, it cost as much as $4 per message to send electronic mail; by 1984, the cost had dropped to 86 cents per message and to as little as 5 to 7 cents for in-house systems.

The second important reason is the widespread and continuing proliferation of personal computers. By 1987, more than 16 million personal computers will be installed in offices, and 11 million of those will have communications facilities.

Electronic mail is similar to the telephone in one important respect: Until both sender and receiver are subscribers on the same network, they can't communicate. In fact, we can carry this concept one step further. Unless everyone in the organization has immediate access to a personal computer or a terminal connected to an E-mail facility, electronic mail will remain a relatively unimportant fad. This was its fate during the 1960s and 1970s, when only the programmers in the MIS department could use it.

But when there is a terminal on the president's desk and on the janitor's desk and on the desk of everyone in between, then it becomes a powerful new dimension of communications. The janitor can send a message to the president, even though he might never have the opportunity to meet him in person, and the president can send a message to the janitor. Horizontal communications — as opposed to vertical communications, which travels up and down the organization's formal chain of command — is an immediate consequence of electronic mail. Some will find this rather frightening, but it is like a breath of fresh air in most companies.

This universal access to E-mail exists only in a handful of small companies today. Even the computer manufacturing companies, with access to computer hardware at cost, have not yet established a 1:1 ratio of terminals to employees. Digital Equipment Corp., for example, has 25,000 employees generating an estimated 100,000 messages per day on an in-house electronic mail system; another 20,000 are waiting for the chance to join the system. IBM, certainly one of the most efficient organizations in the world, expects to have a ratio of 2.2 employees per computer terminal by 1986. Most other technologically progressive companies — the leading banks, for example — have only a few thousand employees on their E-mail systems.

Steve Caswell, editor of the newsletter, "Electronic Mail and Message Systems," summarizes the possibilities and the future of electronic mail quite well by saying that it ". . . will open up a whole new world. I don't know how fast it will catch on . . . habits change slowly. But over a 10- to 20-year time frame, it may rival the telephone."

For anyone whose business requires the communication of words, data, concepts, ideas, proposals and contracts — which is just about all of us — these are important words to consider. The concept of running a business today without a telephone boggles the mind; 10 years from now, the concept of running a business without electronic mail will appear equally insane.

Electronic filing

Electronic filing is an obvious adjunct to personal computers, word processing and electronic mail. One needs the facility to store, retrieve, duplicate and transmit documents from one workstation to another.

Ten years ago, this was a rather novel concept: If one had any form of office automation, it consisted of a dumb terminal connected to a computer that never had enough storage capacity.

Today, the situation is fundamentally different. Mainframe computers now have, in the typical cases, between 10 times and 100 times as much storage as before.

More important, personal computers offer users their own storage space, under their own control. Nobody likes to keep copies of a confidential document on a mainframe computer for which security is suspect. Floppy disks and Winchester disks offer the combination of

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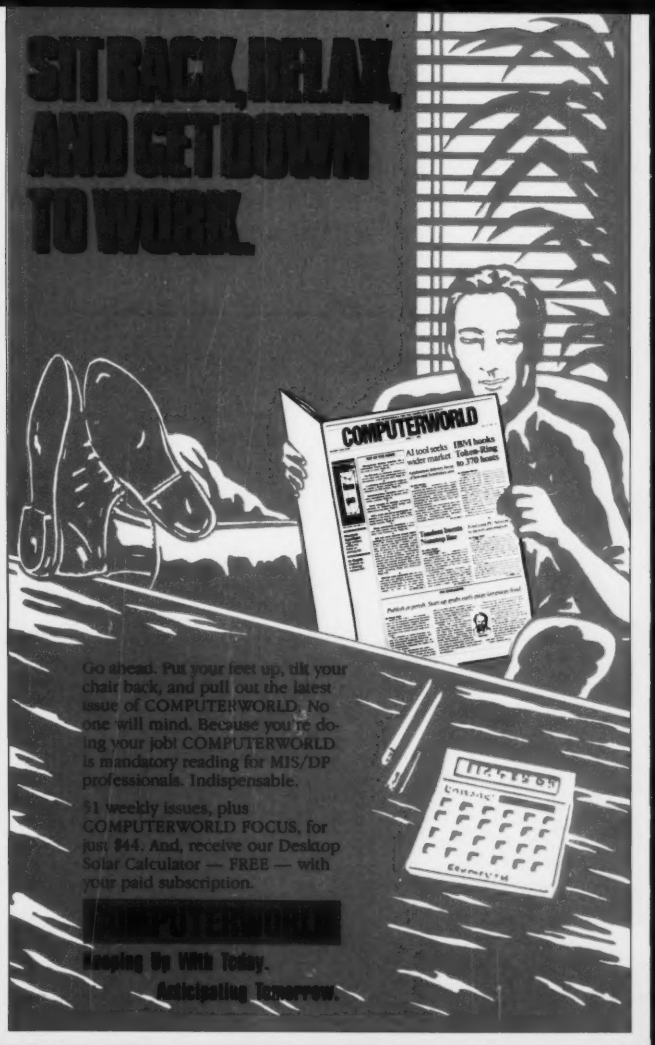

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security and convenience: A single floppy disk can store several hundred pages of information and can be easily locked away in a desk drawer.

The need for electronic filing can be understood by looking at one statistic: American business now deals with 400 billion paper documents; that number is growing by 70 billion documents a year. We are in danger of drowning ourselves in paper.

Today, most organizations have not connected the filing capabilities of PCs to the microfilm and microfiche equipment used to store massive quantities of documents — documents that were generally not created by the organization's computers.

Teleconferencing

Video teleconferencing is the only OA technology that I have my doubts about. The reason is quite simple: It violates what author John Naisbitt calls the "high-tech/high-touch" principle. Putting everyone in a conference room surrounded by bright lights and cameras makes them feel uncomfortable. Projecting their images onto a TV screen invites the inevitable comparison with TV actors and news reporters; most of us don't do very well in that kind of comparison.

> ***American business now deals with 400 billion paper documents; that number is growing by 70 billion documents a year. We are in danger of drowning ourselves in paper.***

Video teleconferencing requires the simultaneous participation of all parties, which is a terrific nuisance when the participants are in different time zones. The equipment is expensive, which means that the teleconferencing facilities have to be reserved in advance.

Figures compiled by Honeywell in its 1984 survey of knowledge workers provide an interesting commentary. While 53% of the respondents had video teleconferencing facilities available in their organizations, only 30% rated the technology "very useful." By contrast, 75% of the group had access to word processing, and 77% rated it "very useful." Similarly, electronic mail was judged "very useful" in the same proportion that it was made available: 40% had such facilities available, and 41% said it was very useful. It would appear that video teleconferencing is oversold at the present time.

The time will come in about five years when our computers and our telephones are married together so intimately that we will no longer view them as separate objects. The low-resolution, primitive computer display screens that we use now will have been replaced by high-resolution color graphics screens substantially better than current TV screens. The bandwidth of our telephone lines will have improved to the point that we can transmit voice, data and graphics images in real time.

We will all have such a device on our desk and another at home and another in our car (or whatever we use for transportation). Then we will have the technology base for videoconferencing; it will be another five to 10 years after that before the business culture learns how to use that technology.

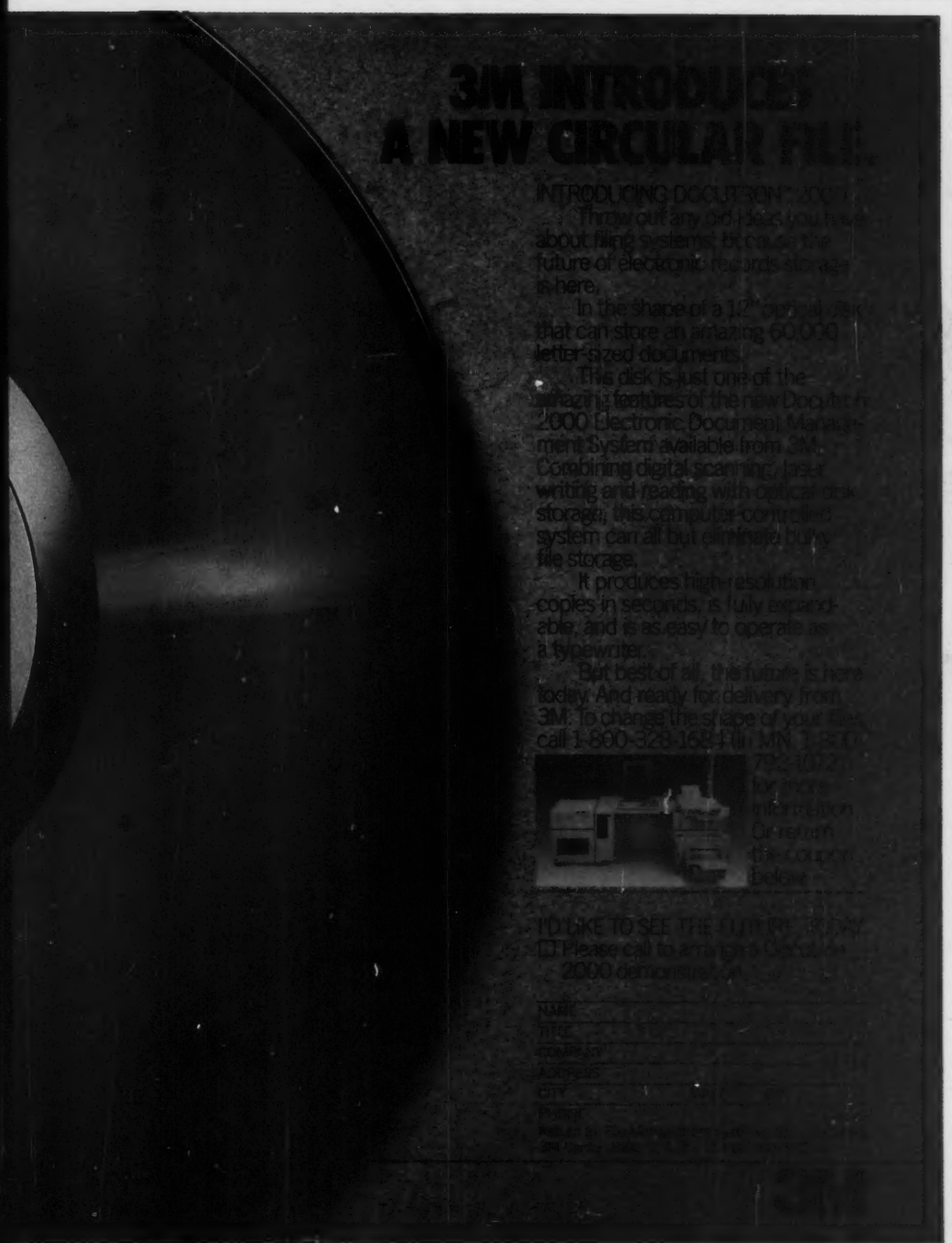
In the meantime, the only form of teleconferencing that is technically feasible and attractive is text-based teleconferencing using electronic mail facilities. The only difference between this form of teleconferencing and standard electronic mail is the degree of sophistication.

Teleconferencing facilities allow a participant to join a conference at any point and to see a record of previous communications on the conference topic between other participants. Some of the commercially available teleconferencing facilities, such as those offered through Compuserve, Inc.'s Compuserve and Readers Digest Association, Inc.'s The Source, allow participants to use pseudonyms (on the theory that anonymity encourages open, candid discussions) and private exchanges between participants in addition to the broadcast form of communication.

Problems with office automation

Why has office automation caught on so slowly in the business world? Probably the biggest single reason is that, as Steve Caswell says, "Habits die hard." Consultant Louis Nauges has compiled a list of typical arguments — or, in his opinion, alibis — for not using office automation technology. They include the following:

- Automation is for blue-collar workers, not white-collar workers.
- It's not for me, it's for others.
- Nobody else is doing it.
- We don't know who to put in charge of OA.
- Our managers will bicker over control.
- Let's first define an OA plan.
- Our managers will do the work of secretaries.
- Managers will waste their time with OA tools.
- What will our managers do with the time they save by using OA tools?
- We have always worked this way.
- It's not the right time.
- Our people are not ready for OA.
- We're waiting for the ideal tool.
- The next generation of OA tools



will be better.

- OA is too expensive.
- Tomorrow, OA will be less expensive.
- I don't know how to justify my OA investment.

There are, of course, individual cases where these reasons are valid; you must be the judge of that within your own organization. However, the important thing to remember is this: Sooner or later, office automation will be an essential ingredient in every business. That much we can all agree on, just as a consensus gradually developed that every office worker should have a telephone.

The only question is whether your company will begin installing OA technology today or whether it will wait for another few years until some magical revelation indicates that the time has arrived.

Today, nobody bothers to cost-justify a telephone; it's accepted as a universal standard. No white-collar worker in his right mind would work for a company in which the corporate policy forbade telephones for its workers. Within five years, the same will be true for electronic mail, electronic filing, word processing and personal OA workstations. So, the important question is not whether your organization has OA today but whether it is making plans and commitments to ensure that it will be there within five years.

The economics of office automation

In many organizations today, OA is still regarded as too expensive. But the economics are as follows:

- The average well-equipped OA workstation costs $10,000. You can buy a dumb terminal for about $300 if you already own a time-sharing system or mainframe with which to connect it. You can also spend $30,000 to $40,000 for a high-powered scientific/engineering workstation with high-resolution graphics capabilities and 100M bytes of disk storage. But will $10,000 buy enough computing power to keep the typical office worker happy?
- A manager/professional with a salary of $40,000 costs his organization $40 per hour (assuming an overhead of 100%).
- Accounting practices in most organizations will allow the workstation to be amortized over three years.

With these economic assumptions, the bottom line is this: If the workstation saves the manager/professional 1½ hours per week of work (or about 3.75% of the working week), it has paid for itself. Circumstances are obviously different in every organization, but it's hard to imagine that the combination of word processing, electronic filing and electronic mail couldn't save at least that much.

However, OA for managers and professionals is really practical only if virtually the entire office has it. Word processing can be used by an individual manager/professional with his own solitary workstation — but such a scenario is almost the same as for a manager who has the only telephone in the office.

Need for speed

The first typewriter was built in the 1700s and demonstrated to the queen of England. However, it was more than a century later, in 1868, that C. L. Sholes patented the device in the U.S. Two businessmen bought the patent rights and demonstrated the typewriter at the Chicago Exposition in 1870. Business organizations were slow to adopt this new technology, though, feeling that correspondence demanded the personal touch of a handwritten document.

It was not until World War I that the demand for rapid, voluminous output overcame this reluctance. And though the electric typewriter was first demonstrated before 1920, another 20 years went by before it caught on. Even now, we are left with a vestige of century-old office automation technology. The standard Qwerty keyboard, which was designed to slow down typists and thus prevent the keys from jamming, is about 30% slower than the seldom-used Dvorak keyboard.

The business office, for a variety of reasons, is slow to change and slow to adopt new technology. A century ago, we could afford this: Most of the resources of an organization were invested in its factories, its raw materials and its machinery. But today, a century after the invention of the typewriter, we can no longer afford to move slowly.

The office is at the center of the information-based competition for economic supremacy. A company can compete successfully only if its most important assets — the information workers in the office — are properly equipped, properly supported and properly trained to use the best available technology to help them do their jobs.

To do this will be difficult: American corporations currently invest only $2,000 to $3,000 per office worker for equipment, and the figure will have to climb to $10,000 to $15,000 within the next five to 10 years to provide proper support. Very few organizations have done this already; many others (especially the larger ones) have begun the process and expect that it will take as long as 10 years to finish.

Somewhere in the 1990 to 1995 time frame, the process will be complete within industry. Those with the "office of the future" will have survived, and those still wedded to the technology of telephone and typewriter will be filing for bankruptcy. For any company of a moderate size — with annual revenue of, say, $100 million or more — the window of opportunity is rapidly slamming shut. It will be far too late to start the office automation process by 1990; it will probably be too late by 1988, and it could be too late tomorrow. ■

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In Depth

The cost of an expert

To quantify the value — and potential savings — of an expert system in a corporate environment, MIS should first understand how much an expert costs the company.

By LEILANI ALLEN

Increasingly, corporations are turning to technology to improve their competitive edge. Banks, airlines, retail stores and other large companies are finding innovative ways to use computers to offer new products and services, to identify and exploit new marketplaces and to improve decision making in highly competitive situations.

One of the key technologies in the information systems field during the next decade will be the development and commercial application of expert systems. The technical and economic obstacles to widespread use of expert systems have largely been overcome, and the costs associated with expert system development and use are also dropping sharply. One of the key issues now confronting information systems executives is the need to quantify the value of such a system for their particular corporate environments.

To do so requires, first of all, a clear-cut understanding of how much an expert actually costs. Only then can we determine how much might be saved by distributing, supplementing or perhaps replacing this expertise with sophisticated software. Only then can we make valid judgments on how best to capitalize on the company's most precious resource — its expertise.

Knowledge makes the difference

Expert systems engineering is an outgrowth of the academic research field of artificial intelligence. AI, simply defined, is a branch of computer science that concerns itself with techniques of symbolic, rather than numeric, processing.

AI has an enormous variety of subfields, ranging from natural languages to research in visual and voice recognition and other human-machine interface technologies. On the hardware side, AI has spearheaded Japan's fifth-generation project to develop supercomputers, which are fundamentally knowledge processing machines.

The area of AI that has garnered the most attention is expert systems, also called knowledge systems. An expert system is software that codifies the facts, rules and heuristic reasoning making up the knowledge and experience base of human experts and makes them available to other individuals for problem solving, instruction or diagnosis. Currently, dozens of expert systems are actively in use around the world (see chart page 63), for everything from oil exploration to medical diagnosis to computer configuration.

What is an expert system? How is it different from conventional systems? In traditional data processing systems, the specific application expertise is encoded in both the program and the data. In expert systems, the expertise is encoded in the data only — the knowledge base. The program structures are separate, forming the inference engine, and the data structures can be changed independently of the program structures. Thus, a new set of data structures can use an existing set of program structures.

CW PHOTO BY P. CHARLES LABOUCEUR

An expert system used to prepare income tax forms might, for example, be used to generate other financial forms as well, just by changing the data in the knowledge base — not the program in the inference engine.

Hurdling obstacles

Many critics charge that artificial intelligence plays a small role outside of scientific or engineering environments and that its role in business is extremely limited. These arguments typically come from one of three bases:

Philosophical — those who question the foundations of AI by refusing to believe that machines can "think." A recent example is *Mind Over Machine* by Hubert and Stuart Dreyfus (Macmillan: The Free Press, New York, 1986). The authors argue that the mechanistic model of human reasoning frequently employed by AI researchers is inadequate for describing higher level thought processes.

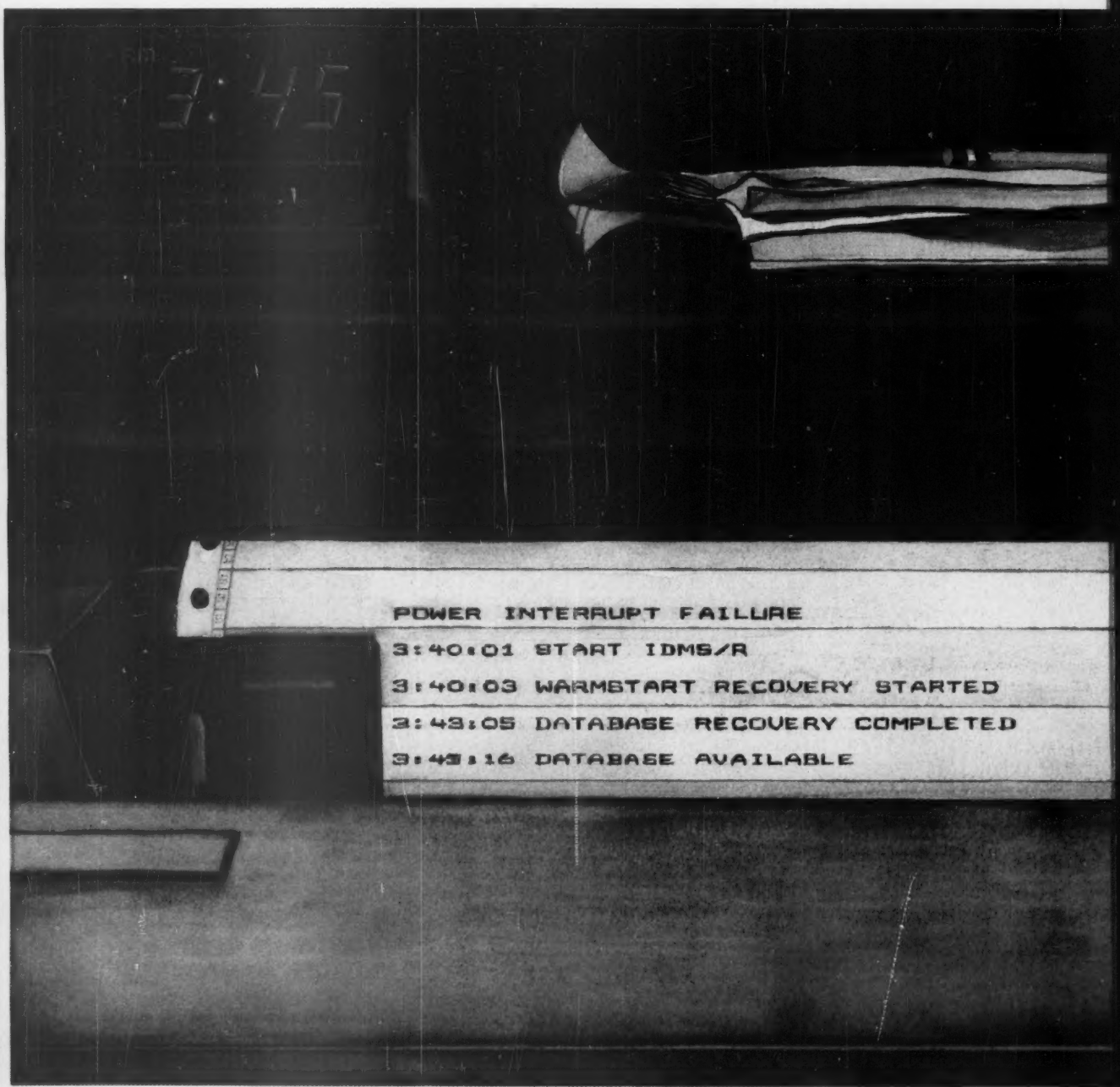
Technical — those who doubt that current or future hardware and software systems will ever have sufficient capabilities to deal with the truly interesting problems or who believe that AI is just conventional programming dressed up in new clothes.

Economic — those who look askance at

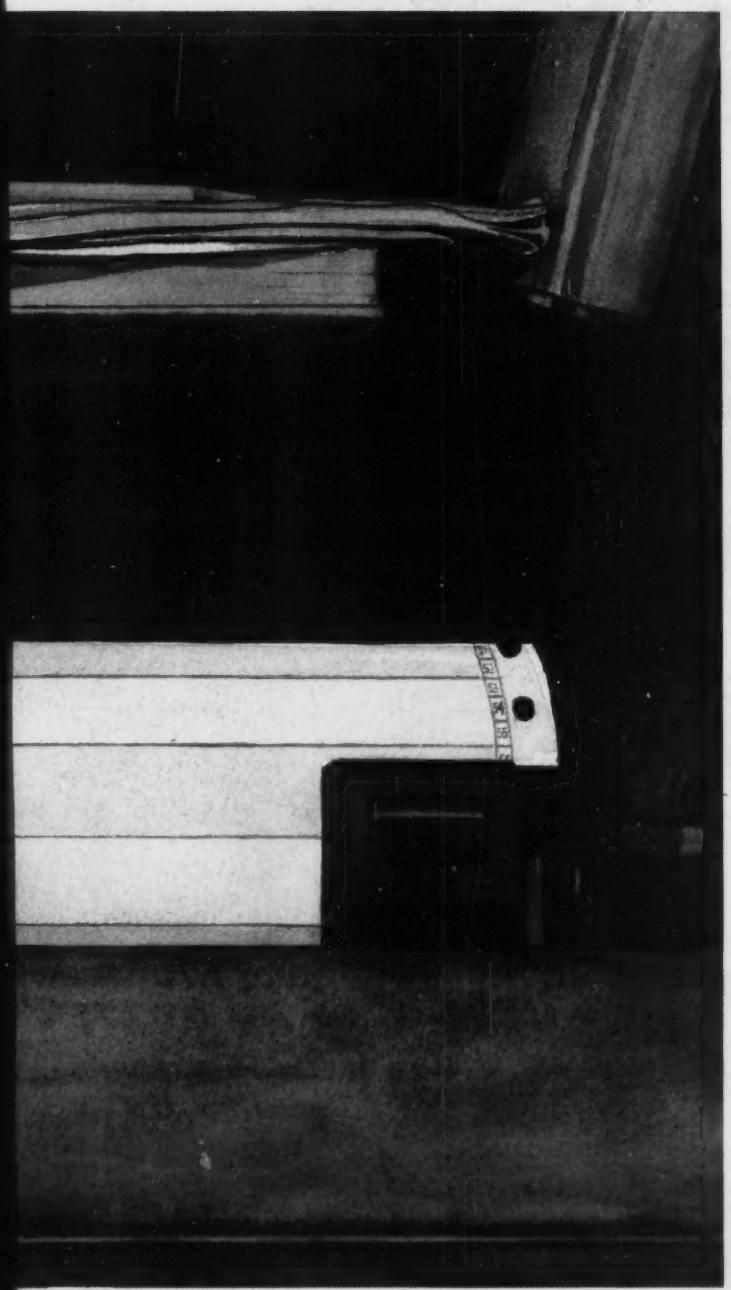
About the author

Allen is president of Knowledge Consortium, an Oakland, Calif., firm specializing in information management. She is also the publisher of "Infovoice," an audio cassette-based technology update service.

How does handle a



your database system crash?



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the heavy investment required for expert systems and doubt that the payback will ever be realized. Even AI proponents routinely cite development costs of $1 million or more.

Until recently, the key sources of expert system costs were the special-purpose processors that had to be installed for development and production and the high price of knowledge engineers — those rare individuals who extract the knowledge of the subject-matter experts and distill this wisdom in codified form. Today, however, both of these economic obstacles have been minimized. Expert systems are being built to run under conventional operating systems on conventional hardware, including personal computers.

> ***Faith, gut feeling and plain old curiosity are as important as financial viability in determining which technologies succeed or fail.***

On the mainframe side, IBM has developed an expert system, called Yes/MVS, to assist operators in MVS installations with job scheduling and other tasks. It was developed using the LISP programming language running under the VM operating system. A second version of the product will be developed using PL/I and will run under native MVS as well. Specialized AI front-end processor interfaces are also being developed for conventional mainframe computers.

On the micro side, firms are enhancing the capabilities of the IBM Personal Computer AT and compatibles with Intel Corp. 80286 chips. The projected introduction of Intel's 80386 chip in 1987 will represent yet another leap forward in allowing expert systems to run comfortably on standard equipment. A hybrid solution is to use programs such as Intellicorp's Knowledge Engineering Environment PC-Host to keep part of an expert system on the mainframe and part on a Personal Computer.

Whether expert systems and other AI applications run as well on conventional hardware as they do on special equipment is not really the issue. The point is that they can run on a firm's normal installed base of machines.

The other cost factor, software development, is dropping dramatically because of the introduction of low-cost AI development tools for both mainframes and personal computers. These systems, called shells, enable skilled programmers (and sometimes subject-matter experts themselves) to develop their own expert systems directly. Thus, the economic picture is changing rapidly and opening the door to wide-scale commercial application of AI technology.

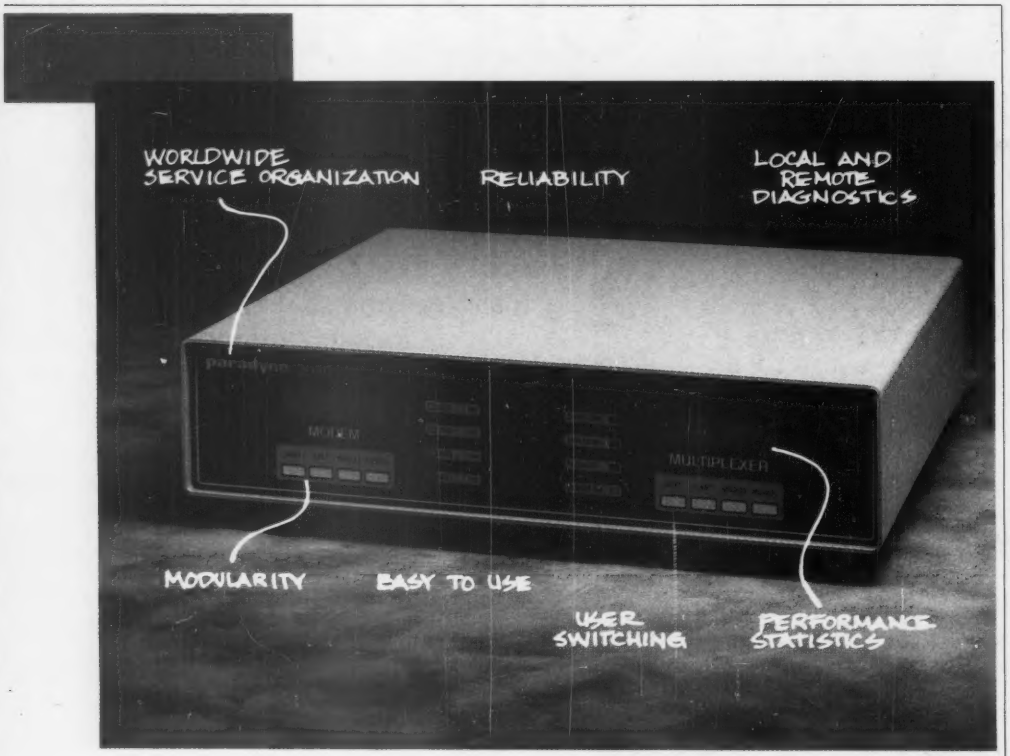
The cost of an expert

Most of the expert systems currently in use were developed in medical or engineering applications. I chose the latter category to investigate because I felt there would be more uniformity regarding costs. For simplicity's sake, I concentrated on engineers working in the electronics industry. The cost categories I took into account include the following:

- Salary.
- Benefits.
- Recruitment/turnover.
- Profit sharing.
- Performing bonus.
- Travel.
- Training.
- Facilities.
- Support.

Salary. The American Electronics Association in Palo Alto, Calif., publishes an annual salary survey of its member companies, subdivided by region and company size. I assume that only larger companies (for example, those with more than 500 employees) would be likely to implement an expert system. I further assume that the expert in question would have at least 20 years of experience.

The survey average



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yielded an annual salary for hardware engineers of $54,000; software engineers at similar levels of experience had an average annual salary of $52,200. In verifying the accuracy of this figure with several firms, I found the estimate to be, if anything, slightly conservative.

Benefits. Salary alone does not tell the story. Radford Associates of Santa Clara, Calif., publishes an annual benefits survey of Silicon Valley firms, almost all of them in the electronics business. The 1984 survey indicates benefit costs, including insurance, time off and retirement plans, that come to $16,524, or 30.6% of base salary.

Recruitment. The Radford survey revealed the average recruitment cost per hire for exempt, nonmanagement personnel to be $3,500. In addition, most of the companies surveyed paid referral bonuses averaging $580 per hire. Total recruitment cost was thus $4,080.

Another aspect to this issue is replacement costs. For the companies participating in the survey, the turnover cost for our skilled engineer was approximately 30% of the payroll cost, or $16,200 on the base salary in question. Assuming that the engineer was recruited ($4,080), stayed for five years and was replaced by someone at the outgoing salary level of $54,000 ($16,200), total costs would be $4,056 per year ([$4,080 + $16,200] ÷ 5), or 7.5% of base salary.

Profit sharing. Direct profit sharing was a fairly common phenomenon for the firms in question; for the survey participants, it averaged 7.9% of base salary. For our engineers, this would mean $4,266.

Bonus. Employees of this caliber are also likely to receive a bonus or commissions and royalties on patents or inventions. Such additional payments would not exceed 10% of base salary, or $5,400 per annum.

Travel. These employees are also most likely to be sent on troubleshooting assignments or to conferences and classes. Assuming six three-day trips per year at an average cost of $1,250 ($800 airfare, $150 per diem) yields an additional $7,500 per year, or 13.8% of base salary.

Training. I assumed two professional seminars per year at $1,250 per class plus an additional $500 for books, manuals and periodicals. This comes to $3,000 per year, or 5.6% of base salary.

Facilities. Our experts must have physical facilities to do their work. These can be as modest as a cubicle or as extensive as a laboratory.

Included would be office space (cost per square foot times size), equipment, telephone, furniture, electricity and so on. *Business Week* (Feb. 25, 1985) reported that the national average of office space per worker was 225 sq ft. Cost-per-square-foot figures for office space vary around the country. In the Silicon Valley, monthly rents ranged from 63 cents to $2.45 per square foot, with most locations costing between $1.70 and $2. Premium office space in San Francisco costs $3.08.

Using an average of $2 per square foot per month for office space ($5,400), $2,531 for equipment, $1,200 for telephone service and $1,200 for furniture and electricity, total facilities costs came to $10,331 yearly, or 19.1% of base salary.

Support. An expert of this caliber would likely have direct access to experienced administrative support. The "1985 Radford Salary Survey" found mid-level administrators and secretaries in the San Francisco area averaging $1,492 to $1,515 per month, rounded off to $18,000 per year. Added to this are benefits, profit sharing and facilities costs. I did not assume the administrator would engender recruitment or travel costs or receive performance bonuses over and above profit sharing. If this is the case, the total figure should be increased accordingly.

The secretary's facilities costs would be the same as for the engineer, except equipment costs would probably be lower. I assumed a $4,000 personal computer or word processor amortized over three years plus $500 per year for supplies. This yields an annual cost of $1,833 for equipment. My final assumption was that the engineer in question would only require half the administrator's time. Total support costs add up to $17,492.

The other side of the support question is the amount of money the company must spend to supervise and manage the engineer. After various attempts, I found it impossible to pinpoint to what level of manager this expert would report (to set a base) or how many other employees such a manager would supervise (to set the percentage); these figures should be readily available.

Thus, the total "incidental" expenses come to $68,569, or 127% of the base salary (see chart next page).

Using the cost estimates

How can these figures be used in calculating the value of an expert system? The simple approach is to view expert systems as replacements for human beings. In this case, the value of the system would be the annual employee cost multiplied by the expected life of the system.

However, as H. L. Mencken once observed, "For every problem there is a solution that is simple, neat and

Some expert systems worth the cost

Project/*Author*	Application Area	System Description
Auditor *C. Dungan* *University of Illinois*	Business	Selects procedures to be used by an independent author
Taxadvisor *R. Michaelsen* *University of Illinois*	Business	Provides estate planning recommendations for client
R. 1 (later called Xcon) *J. McDermott* *Carnegie-Mellon University*	Computing	Configures the DEC VAX-11/780 computer system
Xcel *Digital Equipment Corp.*	Computing	Extension of Xcon to assist sales people in selecting appropriate computer systems
KBVLSI *Xerox Corp. Palo Alto Research Center and Stanford University*	Engineering	Experimental system to aid in the development of very large-scale integration design
Sacon *J. S. Bennett, R. S. Englemore* *Stanford Heuristic Programming Project (HPP)*	Engineering	Advises structural engineers in using the structural analysis program Marc
Crib *T. R. Addis* *International Computers Ltd.*	Fault diagnosis	Diagnosis of faults in computer hardware and software
Raffles *T. R. Addis* *International Computers*	Fault diagnosis	Diagnosis of faults in computer hardware and software
Courtier *T. Wolf, A. Gershman,* *R. Strong* *Cognitive Systems, Inc.*	Finance	Provides high-quality investment advice for portfolio management to bank customers in Belgium
Prospector *P. Hart, R. Duda* *SRI International, Inc.*	Geology	Aids geologists in evaluating mineral sites for potential deposits
Callisto *M. S. Fox, A. Sathi,* *M. Greenburg* *Robotics Institute,* *Carnegie-Mellon*	Manufacturing	Experimental system that models monitors, schedules and manages large projects
Mycin *E. Shortliffe* *Stanford HPP*	Medicine	Diagnoses certain infectious diseases and recommends appropriate drugs
Puff *J. C. Kunz* *Stanford HPP*	Medicine	Analyzes results of pulmonary function tests for evidence of disorder
VM *L. M. Fagan* *Stanford HPP*	Medicine	Provides care suggestions for patients needing breathing assistance
Drilling Advisor *E. A. Feigenbaum et al* *Teknowledge, Inc. for Elf-Aquitaine*	Resource exploration	Diagnoses oil well problems and recommends corrective and preventive measures
Genesis *Intelligenetics*	Science	Helps scientists plan and simulate gene-splicing experiments
Heuristic Dendral *E. A. Feigenbaum et al* *Stanford HPP*	Science	Identification of organic compounds by analysis of mass spectrograms

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wrong." Even the most sophisticated expert system is unable to outthink a human. Moreover, these systems are not yet able to learn or to think independently or creatively. So where might an expert system be profitably employed? There are eight possible approaches: preservation, cost-avoidance, distribution, reassignment, training, supplement, opportunity and competitive edge.

• *Preservation.* One of the key difficulties companies find is retaining the expertise of departing employees. An engineer with 20 or more years of experience possesses a vast store of knowledge about how a given system or process works — knowledge that simply cannot be replaced, even if another engineer is hired to fill those shoes. By codifying some of the departing engineer's expertise, the firm can preserve that knowledge to help solve future problems. Campbell Soup Co., for example, recently created an expert system to codify the 44 years of expertise of one of its production engineers.

Calculating the value of the expert system could focus on the cost of the departing engineer multiplied by the number of years the system is expected to be of use. Thus, if the veteran earned $122,000 and the system would be in use for three years, its value would be $366,000. If a more junior engineer was hired to take the expert's place, the calculation would take the pay differential between the two engineers multiplied by the number of years the system would serve as a mentor.

In the most drastic scenario, the whole process or product line might have to be shut down if the expertise were no longer available. In this case, the profits from the process or product would be compared with the cost of developing and maintaining the expert system.

• *Cost-avoidance.* Another way to look at this scenario would be on the basis of cost-avoidance. Would having the expert system mean we could delay hiring the junior engineers for some time? The system's value would then be the junior engineers' costs multiplied by the number of months hiring was delayed.

Another approach would be to calculate the cost of bringing in consulting or training help to supplement the junior engineer's expertise. A third approach would be to focus on the problems themselves and calculate what it would have cost the company to solve the problem if the expert system had not been in place.

• *Distribution.* Cost-avoidance becomes particularly relevant if experts are hired merely to keep the expertise available in different locations. It's far less expensive to ship software around the country than to move families. GTE Data Services, Inc., expects to use an expert system for remote troubleshooting on its long-distance networks.

• *Reassignment.* Suppose it is not feasible or appropriate to replace the expert. It is still possible for the system to add value by allowing scarce expertise to be reassigned from a support role to a development role that would have a greater impact on the bottom line.

For example, one or more product engineers might support a number of sales representatives in a sales territory. These representatives are constantly asking for product enhancements, which are delayed because of lack of resources. If an expert system could answer the majority of representatives' and customers' technical questions, the company might reassign the engineers to enhancement activities. In this case, the value of the expert system would be the market impact of the enhancements — the additional units sold or existing units upgraded.

• *Training.* Even if permanent reassignment is not feasible or desirable and distribution is not an issue, the cost of training new employees on the features and functions of company products and services can be exorbitant. Very often, senior people are recruited to teach novices, either on a formal or informal basis. Even a professional training staff must call upon the experts for assistance in detailed technical training.

For labor-intensive industries such as banking and insurance, having an expert system available to newcomers to explain the complexities of, say, international funds transfers or commercial underwriting could save countless hours of time for senior specialists and could focus their attention on generating new business.

Such systems might also help standardize service and result in fewer errors. For example, American Insurance Group in New York has built a $1.9 million production model of an expert system that would perform these functions in 14 offices nationwide and is expected to pay for itself in 2½ years.

In such a case, the value of the expert system would be calculated by first ascertaining the cost of the expert on a per-hour basis, determining the average number of hours of interaction each recruit requires from this expert and multiplying this figure by the expected number of recruits per year.

Let us say a commercial insurance department has five senior underwriters at an average cost of $100,000 per year (approximately $50 per hour). Each underwriter spends, on average, 160 hours per recruit during the recruits' first year in training giving advice, answering questions and so on. The company expects to add four new employees in the coming year.

If an expert system could halve the amount of interaction, its value would be as follows:

$50 x 160 hours = $8,000
$8,000 x four recruits = $32,000
$32,000 x five underwriters = $160,000
$160,000 ÷ 2 = $80,000

This number would be multiplied by the number of years the system would last without major enhancement and, as usual, would be balanced against the development costs.

• *Supplement.* Of course, there is no reason to assume that the senior underwriters — or loan officers, branch managers and other personnel — would not also use the expert system to test and verify their own judgments in tricky cases by drawing on the expertise of their colleagues in-house or anywhere in the world.

This, of course, is the rationale behind most of the medical systems in use. Sometimes the results can be dramatic. Last year, an elderly patient arrived at the LDS Hospital in Salt Lake City. As part of the check-in procedure, he gave his medical history to the hospital's expert system called Help. The system combined the information with the results of the patient's EKG to

Continued on page 68

What an expert costs: $122,569

Typical annual salary and benefits figures for an experienced engineer, based on industry averages and the author's estimates.

MITCHELL J. HAYES

. . . Plus

Benefits (30.6%)*	16,524
Recruitment and turnover (7.5% amortized over five years)	4,056
Profit sharing (7.9%)	4,266
Bonus/royalties (10%)	5,400
Travel (13.8%)	7,500
Documentation and training (5.6%)	3,000
Facilities (19.1%)	10,331
Administrative support (32.5%)	17,492
Total	*$122,569*

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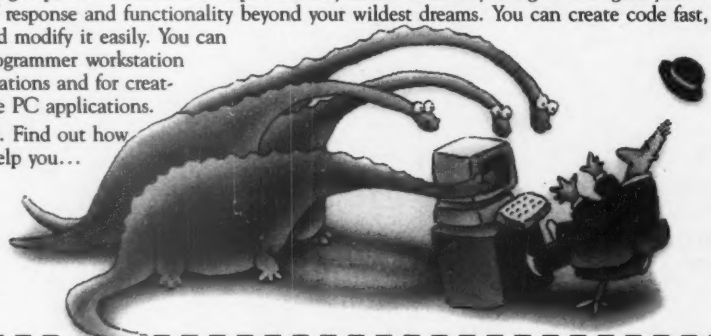

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Investing in an expert system: What you need

Because of the incredible range in complexity of expert systems, establishing average or typical costs for system development and maintenance is impossible.

Costs range from a few thousand dollars to develop a simple system on a personal computer to several million dollars for a stand-alone configuration.

The following list contains the broad categories of costs that an installation is likely to encounter in creating an expert system. Least-cost alternatives are listed first.

Initial familiarization with the technology.
- Self-study tutorials.
- Formal classes.
- Outside consultants.

Development.
- Additional hardware.
  - — Upgrade PC.
  - — Upgrade memory, direct-access storage device, CPU.
  - — Outside service bureau.
  - — Dedicated special-purpose system.
  - — Existing hardware.
  - — Percentage of installed micro base dedicated to expert system-related activities.
  - — Percentage of current mainframe configuration dedicated to project.
- Additional software.
  - — Artificial intelligence development shell.
  - — Additional programs or utilities (data base, spreadsheet, graphics packages).
- Existing network.
  - — Percentage of existing configuration to be dedicated to the development effort.
- Additional network.
  - — Higher speed or dedicated lines and nodes to be used by the designated experts and/or developers.
- Existing labor.
  - — Calculate fully loaded cost for time spent by developers, experts and supplemental staff.
- Additional labor.
  - — Calculate fully loaded cost for added staff (full- or part-time, permanent or temporary, including consultants).

Integration with existing systems.
- Programming effort for reliable data transfer.
- Testing for system function, integrity.
- Update documentation.
- Procedural changes.

Training.
- For developers.
  - — AI concepts.
  - — Expert system development techniques.
  - — New hardware and/or software.
- For users.
  - — Interaction with the system.
- For managers.
  - — Using the system to make business decisions.
  - — Understanding system possibilities and limitations.
- For systems staff.
  - — Performance implications of new hardware and software.
  - — Troubleshooting or other operational techniques.

Project administration.
- Cost/benefit analysis.
- Supervision.
- Reporting.
- Interaction with AI vendor.

Maintenance.
- Resolving operational difficulties.
- Expanding the knowledge base.
- Validating cost/benefit analysis.

In most cases, the costs will be similar to those for any software development effort, including familiarization and training costs. In some instances, costs may actually be lower than with conventional software systems, especially in the user interface area.

Most expert systems are self-auditing; that is, they instantly allow the user to see how the system arrived at its conclusion. This negates the need for voluminous documentation. In addition, good AI shells support creation of self-descriptive screens, virtually eliminating the need for special training.

Over the long run, the most significant costs stem from an ongoing relationship with the AI vendor. The issue here is whether the installation gains self-sufficiency in the technology. Can you build Version 2 of the system without additional assistance or are you dependent on the vendor for enhancements? Dependence means the development costs will reoccur each time a new version is created.

The more a firm is willing to invest in training its own experts, the less it will end up paying outsiders. Moreover, the company will realize added return on its training investment by then having employees who can use their expertise in creating additional expert systems.

— LEILANI ALLEN

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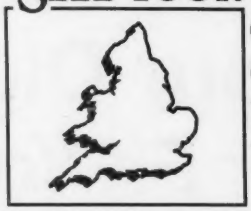

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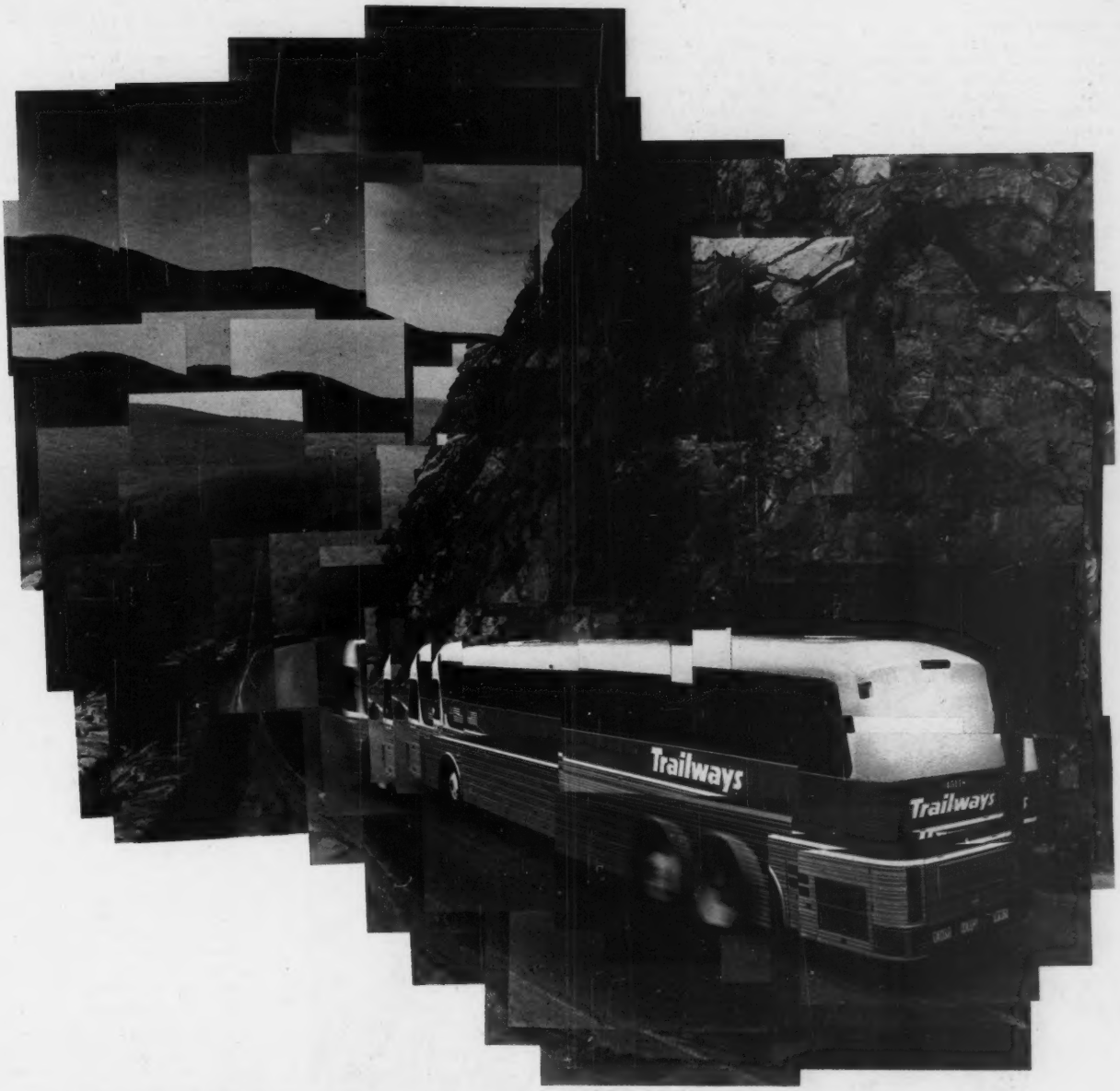

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AT&T
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Continued from page 64

correctly diagnose that he was having a heart attack. Surely the patient would assign the expert system an extremely high value indeed.

At Westinghouse Electric Corp., an expert system with slightly more than 100 rules helps engineers select the materials needed for building nuclear penetrators. Considering the financial — not to mention political and moral — consequences of faulty decisions in this area, the expert system may eventually bring in a thousandfold return on investment.

In this sense, the expert system would be a supplement to existing expertise, and its value would increase correspondingly. This added value would be particularly evident in professions such as finance and accounting, in which decisions are strongly affected by changes in laws or regulations.

These changes could be input to the expert system inexpensively and easily, and the experts could then ascertain the effect of the rule change on the company's policies or procedures. The dollar values here become softer but would probably best be calculated by assessing the relative percentage of decisions requiring up-to-date information and the dollar value of these decisions (revenue generated, clients gained, competitors forestalled).

• *Opportunity.* The best way to justify a new technology is to focus on its ability to generate additional revenue, not just reduce operating costs. Expert systems may allow companies to offer whole new activities. For instance, Shearson Lehman Brothers, Inc., a subsidiary of American Express Co., is using an expert system to perform interest rate swapping. Of the $15 million the firm earned last year through this activity, $1 million could be attributed to the installation of the system.

Government agencies can also offer new services by using expert systems. The U.S. Department of Agriculture keeps a Personal Computer-based system in place to determine when crops need irrigation and pesticide treatment.

• *Competitive edge.* Ultimately, expert systems can and will be used to give corporations an advantage in the marketplace. A well-known example is Digital Equipment Corp.'s Xcel system, which performs the tedious and time-consuming task of configuring DEC's mini systems. This results in decreased lead times, a factor that can be exploited to increase hardware sales. Many software firms are adding expert components to their existing products in order to increase differentiation and maintain a leading-edge profile.

Whether or not these interfaces are expert systems in the strict sense is unimportant. If some kind of intelligent interface is required because of competitive pressure or market demand, then the increase (or simple preservation) of market share is calculated and used to offset the development and maintenance costs.

Caveats

Every application is not necessarily appropriate for the development of an expert system. There are certain key prerequisites, chief among them being the existence of a known body of expertise in a given field.

I am not attempting to prove the validity of the figures I used for the calculation. The dollar amounts will obviously have to be calculated using real data from each enterprise. The important point is the methodology.

Also, in no way am I attempting to place a price tag on human beings, nor do I advocate widespread replacement of human workers with machines. Like most people, I would still prefer to have my workplace populated by humans.

Rather, I am trying to help executives quantify the value of the corporation's existing investment in expertise and whether this usually significant investment can be enhanced through judicious application of expert system technology.

> ***Campbell Soup Co. recently created an expert system to codify the 44 years of expertise of one of its production engineers.***

Faith factor

In addressing emerging expert systems technology from a financial perspective, this article presents a technique to quantify the cost of a human expert. This quantification can then be used to assign a value to the system that would preserve, redistribute, supplement or increase the availability of scarce human expertise. This value can then be balanced against the cost of developing and maintaining the expert system to determine whether the technology makes good business sense.

In any financial analysis, it is childishly simple to manipulate the figures to arrive at the desired conclusion. No doubt such dubious accounting has been, and will be, used in expert systems development as well. On a more positive note, every business decision maker can cite numerous examples of successful and profitable ventures that were initiated despite what the numbers said.

Faith, gut feeling and plain old curiosity are as important as financial viability in determining which technologies succeed or fail, and I surely do not expect to supplant them. Rather, analyses such as these can focus our attention on the key issue — that technology is assessed from an economic perspective. ■

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MANAGEMENT

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Les Gilliam

Scoring your career success

Is your career zipping along in the fast lane, or have you ended up on the access road, not sure if a dead end is ahead? If your progress has leveled off, have you stopped to take a real, hard and honest look at your capabilities and potential? What are the principal factors that need attention to get you back to upward mobility?

Most of the problems or difficulties that data processors encounter on their career ladders will likely fall into one or more of the following seven categories: health, attitude, time management, customer relations, planning and control, communications skills and application of knowledge.

How would you rate yourself on these? Do any of these areas need improvement?

• Health. It seems that most everyone in computing these days is continuously under some kind of pressure. The pace is fast, the manpower inadequate, the deadlines unrealistic and the budget woefully small. The days grind on, and energy ebbs. In some circumstances, it truly is the survival of the fittest.

To succeed then, requires a disciplined program of vigorous exercise, proper diet and regular checkups. The ability to maintain a consistently high level of physical and mental energy puts you ahead of the competition.

• Attitude. How do you feel about your job, your boss, your peers and your subordinates? Do you look for op-

See **SCORING** page 76

Gilliam is an independent computer and management consultant based in Ponca City, Okla.

Integrating corporate CAD

Changing roles requires manager skills, teamwork

By Rosemary Hamilton

The computer-aided design (CAD) department was once an isolated world of engineering and design professionals within a corporation. But as more and more organizations attempt the vast task of corporatewide integration, CAD managers are faced with the challenge of maintaining productive departments while serving the broader information requirements of their organizations.

These managers must not only contend with the formidable technological task of linking different computer systems within the organization, but they must also work toward blending three vastly different worlds. CAD managers must minimize conflicts as they team their engineers with the manufacturing department and then with the corporate MIS department.

CAD managers interviewed by *Computerworld* say there are a number of approaches toward solving this conflict, from establishing committees with representatives from the three organizations to having a computer-aided design and manufacturing (CAD/CAM) manager actually join MIS and function as the engineering and manufacturing voice within that group.

The conflicts between these departments have "historically been a problem in American industry," says Robert Brauburger, chief engineer at Chrysler Corp. "The majority still struggle with it. We have set up a committee to eliminate that problem."

According to Brauburger, the committee includes representatives from manufacturing, engineering and MIS. "Each is different in its method of approach. You use a different type of person in each of the three areas."

Engineers, he notes, generally have a "highly academic backround," whereas manufacturing is made up of mainly "tool engineers," and MIS people have strictly a "business backround."

The only way to satisfy individual needs and meet overall corporate goals is to continually stress and promote "affiliation and compromise," he advises. By doing so, this committee has managed to develop a five-year plan that maps out how

See **INTEGRATION** page 74

Northeast DP salaries top scale

By Donna Raimondi

Florida computing systems directors in large shops who want to double their annual salaries may be able to do so just by moving to the Big Apple.

According to the 1986 Local Metropolitan Computer Salary Survey, conducted by Source EDP Personnel Services, Inc., New York computing systems directors in large shops earn an average of $105,000 per year, as opposed to a relatively paltry $58,700 in the Florida cities of Tampa or Orlando. The study examines 63 computer-related nonmanagement, management and sales positions in 56 metropolitan areas in nine regions of the U.S. and Canada.

Small and medium-size computer installations pay much less than large ones. The director of a small shop, defined by the study as one with the equivalent of an IBM System/34 or smaller machine and a staff of fewer than 10 people, will generally earn from $20,000 to $35,000 less than the large-system director. A director of a medium-size shop, in control of an installation with the equivalent of an IBM 4300, 3031 or System/38 and from 10 to 40 staff members, can expect to earn $10,000 to $20,000 less than the director of a large shop.

"In looking over the results of past years' studies, I noticed a current trend for salaries to remain at a fairly steady rate," says Sheryl Link, a spokeswoman for Source EDP. The studies, conducted since 1966, show that salaries rose fairly rapidly from the middle 1970s to the early

See **NORTHEAST** page 71

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Managers on the Move/**70**

Calendar: Shows, conferences, seminars/**76**

INSTANT ANALYSIS

"To get promoted from the MIS department to chief information officer, it's not so much who you know, it's who knows good things about you."

— Grady Baker, executive vice-president, Georgia Power Co.

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MANAGERS ON THE MOVE

David M. Carlson has been promoted to the position of vice-president, corporate information systems, of K Mart Corp. of Troy, Mich. He will be responsible for development, implementation and maintenance of all corporate systems including accounting, administration, distribution, point-of-sale and finance, as well as a recently announced satellite project. Carlson, 45, joined K Mart in July 1985 as vice-president, electronic merchandise systems. Last November, he was elected to the board of governors of the Uniform Code Council, and in

David Carlson

April, he became a member of the board of directors of the Information Systems Division of the National Retail Merchants Association.

■

Charles J. Peoples has been appointed assistant regional commissioner for data processing in the Southwest Region for the U.S. Internal Revenue Service. He will work out of the region's Dallas headquarters, assisting the regional commissioner in planning, coordinating and evaluating the processing of returns, computer services, revenue accounting, public affairs and taxpayer service. Peoples, 45, began his government career with the Library of Congress, joined the IRS in 1966 and has since held several positions in its service centers. Peoples succeeds **Henry H. Philcox**, who was named the IRS deputy assistant commissioner for returns and information processing at the national office.

■

Bruce Stevens has been named vice-president, corporate management information services, for Carlson Companies of Minneapolis. He will be responsible for data processing, telecommunications and office automation. Stevens, 39, recently joined the company after serving as director of information networks at Northern Telecom, Inc. of Nashville.

■

Hillary Reilly has been named executive director, information services, at Software AG of North America, Inc. in Reston, Va. Previously she was responsible for corporate information services for the Federal Home Loan Mortgage Corp. In her new position, Reilly will create strategic directions for the company's information resources.

■

William Parton has been promoted to director of data processing at Reliance Standard Life Insurance Co. of Philadelphia. His present responsibilities for data processing systems programming and operations will be increased as data processing systems are brought in-house. Parton joined the company in 1984.

■

Edward F. Phares has been appointed divisional vice-president, corporate information systems, of American Hoechst Corp. in Somerville, N.J. Phares joined the company in 1972 as a senior programmer analyst and later served in several positions, including manager and director of corporate information systems.

■

William A. Dvorak has been named senior manufacturing systems analyst at ITP Boston, Inc., where he will be responsible for the support of manufacturing engineering services. Dvorak comes to ITP Boston from Charles Stark Draper Laboratories, where he was a program manager.

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Our ASCII terminals are designed to fit into existing systems. Even if the systems aren't ours.

Emulation Capability	
3161	IBM 3101 Model 881 ADDS Viewpoint* Hazeltine 1500* Lear Siegler ADM-3A* Lear Siegler ADM-5* TeleVideo 910*
3163	IBM 3101 Model 881 DEC VT 52* DEC VT 100* TeleVideo 950*
3164	IBM 3101 Model 881

For example, our basic ASCII Display Station, the IBM 3161, emulates up to six terminals. And the advanced-function 3163 emulates a number of higher level ASCII data streams.

Features	3161	3163	3164
Screen size	12"	12"	14"
Lines x characters	25x80	25x80	25x80
Character matrix	8x16	8x16	8x16
Double-sized characters	No	Yes	Yes
Line drawing characters	24	24	24
Vertical scroll	Jump	Jump/ Smooth	Jump/ Smooth
Definable function keys	24	24	24
Windowing	No	Yes	Yes
Partitioning	Horiz.	Vert./ Horiz.	Vert./ Horiz.
Characters in buffer	1920	7680	7680

What's more, every one of our ASCII terminals can operate in its own function-rich native mode.

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Our unique plug-in cartridges allow for considerable flexibility in your operation. For example, simply by switching cartridges you can shift a terminal from one data stream to another.

And, in many countries cartridges are also available that go beyond emulation to let you operate your ASCII terminals in several foreign languages. Appropriate foreign language keyboards are also offered.

Enhanced ergonomics. Another family trait.

All our ASCII terminal keyboards have 102 keys. But that's not all they have in common. Every keyboard also has a low profile, gentle contour and typewriter touch.

And our keyboards have programmable function and editing keys so they can be custom-tailored to fit your application needs. The 3163 and 3164 models also have redefinable and recappable keys.

Superior ergonomic design isn't confined to the keyboard, however. All three displays tilt and swivel for maximum user satisfaction. And, of course, by making the display easy to read, we made it easier on the eyes. In addition to the 8 x 16 character matrix, we gave it an advanced non-glare etched screen, cursors, and character and field attributes like blink, reverse video, underscoring and dual intensity.

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Northeast DP salaries at top

From page 69

1980s and then leveled off "because of recession and extreme competition for jobs," Link says. Salaries picked up again in 1983 and 1984, then leveled off again for 1985 and 1986.

The second highest salaries do not always go to big-city managers — but they do go to Northeasterners. Average salaries for large-shop directors range from $85,000 to $86,500 in New York's Westchester County and on Long Island, parts of central and northern New Jersey and Connecticut.

The computing systems director of a large shop is one who controls the equivalent of an IBM 3033 or 3080 series or larger with a staff of more than 40 people.

Although the Tampa and Orlando areas earn the distinction of paying the least for large-shop directors, these areas are closely followed by Louisville, Ky., at $60,000; the Raleigh, Durham and Greensboro, N.C., area, at $60,800; and the Indianapolis and Fort Wayne, Ind., areas at $61,000.

Companies in the nine Middle Atlantic metropolitan areas shell out the highest salaries, paying an average of $78,900 for top-level managers. But salaries in individual municipalities range widely.

Salaries in the Middle Atlantic region decrease from New York's $105,000 all the way to $62,400 in Richmond, Va. Large-shop directors in other Middle Atlantic cities earn salaries of $64,300 in Baltimore, $70,200 in Philadelphia, $72,900 in Pittsburgh and $78,600 in Washington, D.C.

The South Atlantic region, composed of Atlanta; Charlotte, N.C.; Raleigh/Durham/Greensboro; Miami; and the Tampa and Orlando areas, has the lowest average remuneration for U.S. directors of large computing centers at $61,200. Pay ranges from Atlanta's $63,800 to Tampa's $58,700.

Pay at Canadian companies for large-system computer center directors is shown in the study to average $76,000; however, that is expressed in the Canadian dollar, which is worth about three-fourths of the U.S. dollar.

Pay there ranges from $81,900 (Canadian — about $59,800 in U.S. dollars) in Edmonton and Calgary, Alta., to $71,000 (Canadian — about $51,800 in U.S. dollars) in Montreal and Ottawa.

Pacific region second

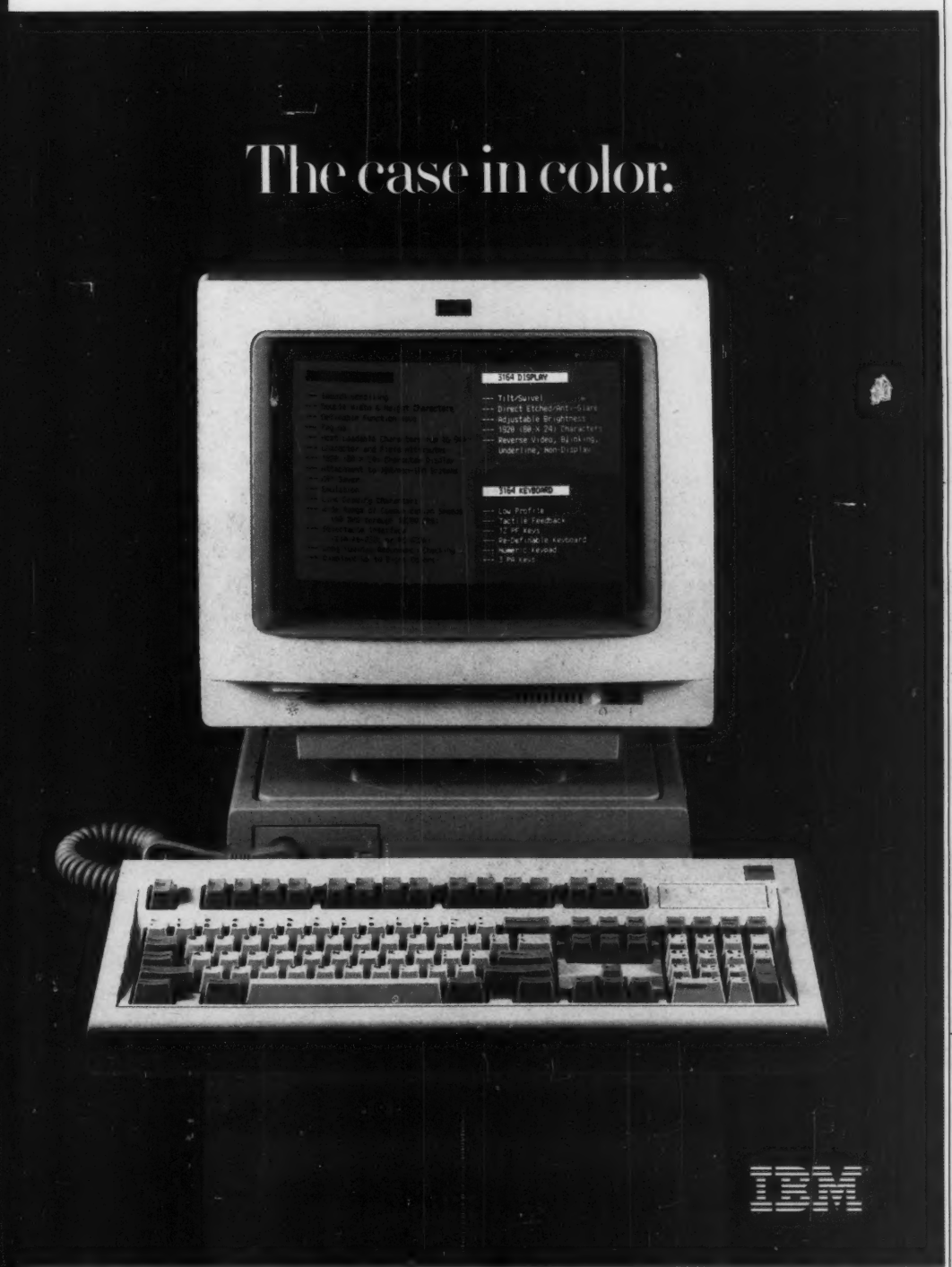
The Pacific region follows the Middle Atlantic for second highest salary level in the U.S. Pay ranges from Los Angeles' $82,000 and Orange County, Calif.'s $78,100 to Portland, Ore.'s $63,800 and Seattle's $63,700. San Francisco's directors can expect to earn $74,600, whereas their brethren in the Silicon Valley pull in $76,300, and those in San Diego earn $68,800.

Third place goes to New England, where the average of Boston's $69,900, Hartford, Conn.'s $67,100 and New Hampshire's $64,400 is raised considerably by Upper Fairfield County, Conn., and the New Haven, Conn., areas, which average $77,900.

Close on New England's heels is the West North Central region, with an average director pay level of $68,800. Chicago leads that region with $76,400, and the Des Moines, Iowa, and Omaha areas are at the bottom with $64,300.

The South Central region has an average director's salary level of $65,500, followed by the Mountain states' $64,800, East North Central's $64,100 and South Atlantic's $61,200.

Computing systems directors in small shops receive roughly the same pay level as large-shop operations managers, medium-size shop technical services managers, senior analysts, project leaders and consultants with more than seven years of experience as well as data base administrators and specialists, also with more than seven years' experience.



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NETWORKING

Integration of CAD

From page 69

Chrysler will "develop interfaces between different brands of computers," according to Brauburger.

Rather than take the committee approach, General Dynamics Corp. includes the CAD manager in the MIS organization. As director of CAD and a member of MIS, called the data systems division, Doug Lewis says it is more advantageous to have a strong voice for engineering and manufacturing within MIS than to have a representative approach MIS from the outside.

"I came up from engineering and have worked in manufacturing," he says. "I'm closer to that world than MIS." Working within MIS has "minimized conflicts," he notes.

However, there are also underlying tensions between engineering and manufacturing divisions, and Lewis must coordinate the efforts of both. Furthermore, he must coordinate the 10 different geographic divisions.

Between engineering and manufacturing, "there's friction if you let engineering take the lead," Lewis says. Manufacturing must ultimately make the parts that engineering designs, and often manufacturing claims that engineering designs parts without taking the manufacturing process into consideration.

"Manufacturing is usually much happier when they are involved in the process from the beginning," Lewis says. "We can't let engineering go off on its own."

Lewis also works to coordinate the different divisions across the country to maintain corporatewide consistency and downplay rivalry among divisions.

Representatives from the different divisions meet "to iron out problems regarding the technology and to generate excitement about new technologies," Lewis says. The divisions also publish newsletters to keep their counterparts in other areas informed of their activities.

The manager of engineering at Marathon Electric Manufacturing, Inc., a maker of motors and generators in Wausau, Wis., also reports to the director of MIS.

"There really isn't a conflict between MIS and engineering in our case because I have a very supportive boss," says Peter Link, manager of engineering systems. "He has a good understanding of engineering and a natural inkling toward that."

> ***'Manufacturing is usually much happier when they are involved in the process from the beginning.'***
>
> — Doug Lewis
> General Dynamics Corp.

However, Link says the relations between engineering and manufacturing do not run as smoothly. "I try to deal with it, but it hasn't been too successful yet," he claims. "One way would be to make them sit together, but that doesn't always work."

However, Link expects the relationship to improve in the future. "As we mature in CAD/CAM, that will force a better understanding because they'll be using the same data."

At American Motors Corp., which began automating its CAD operation in late 1983, the engineering and manufacturing departments are "distinct from the MIS group" on matters that pertain to specific departments, says Cary Coverdill, supervisor of CAD methods.

However, he adds, all departments are in "close communication" on general-purpose issues, such as acquisition of equipment like word processors that would be used throughout the corporation. On matters of procuring engineering systems, "MIS doesn't get involved," he says.

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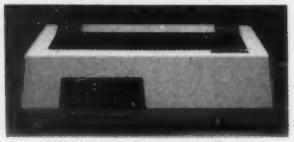

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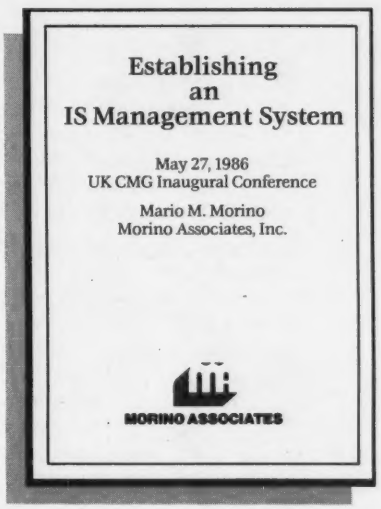

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Scoring your career success

From page 69

portunities to complain or find excuses? Are you self-centered and only looking out for No. 1?

You may want to consider a success principle that has been proven by the test of time. If you do your very best to make your boss successful, you will be successful. If you look for ways to make your company more successful, you will be more successful. The same applies to your users, peers and subordinates.

If you just cannot maintain a positive, helpful attitude in your current situation, then maybe you should look for a place where you can.

• Time management. The precious commodity we call time is often misused or left unused. How much more could be accomplished if we conducted our daily activities in a more disciplined fashion?

Many good magazine articles and books have been written on the subject. For now, let us just consider two words — priorities and delegation. Are you spending your time on the things that are most important to your boss and to your career? Some people take just a few minutes each morning to plan their daily activities by priority, and, as a result, their effective productivity is greatly improved.

The transition from professional to manager is often difficult for the data processor. After having the responsibility for producing the technical product, it is hard to turn oneself loose from the tasks and tools that have become so familiar. However, growth in the supervisory or management ranks will be directly proportional to the ability to accomplish desired results through delegation.

• Customer relations. Do you think of your users as customers? How often do you get out of your office to go to the users' turf and try to better understand their environment, problems and goals? Data processors often have a reputation for sitting in their ivory towers, behind their walls of security, waiting for the user to beg for service. The No. 1 priority must be the solving users' problems.

The user should be treated as a customer who has a choice in purchasing your services and should receive a high-quality product at a competitive price.

• Planning and control. The successful data processor is a forward thinker, looking ahead for opportunities for improvement and anticipating the needs for machines and people. Budgets and work plans are useless unless they are executed properly and controlled.

Assuring quality, reporting progress to management and users, meeting target dates and managing staff effectively are all critical rungs on the ladder of success.

• Communication skills. Success in the computer field, or any other, requires skill at communicating, both orally and in writing. There are several groups that must be kept informed, including superiors, users, subordinates and, often, outsiders.

Good communication depends far more on common sense and sensitivity to people and circumstances than on speaking or writing ability. Do not misunderstand. Grammar is important, as is properly organized material, but the primary objective is that the listener or reader gain an understanding of the intended message.

Your ability to motivate, or achieve cooperation and support, will be directly related to your communication skills. Time and money spent on sharpening these skills are investments that can pay rich dividends.

• Application of knowledge. Your knowledge is a composite of formal education, experience and self-motivated learning. Unless this knowledge can be applied to solving user or management problems, it is of little or no value to you or your employer.

Expanding your knowledge should be a continuous process. Your schedule must reserve an appropriate amount of time for reading, study, classes, seminars, exhibits and conferences.

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JULY 28-29, AVON, COLO. — **How to Manage Data and Information as a Resource.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

JULY 28-29, BOSTON — **Fast Algorithms Seminar.** Contact: Technology Training Corp. Seminars, Dept. FA, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510.

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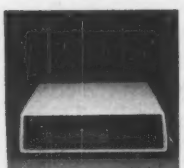

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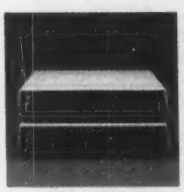

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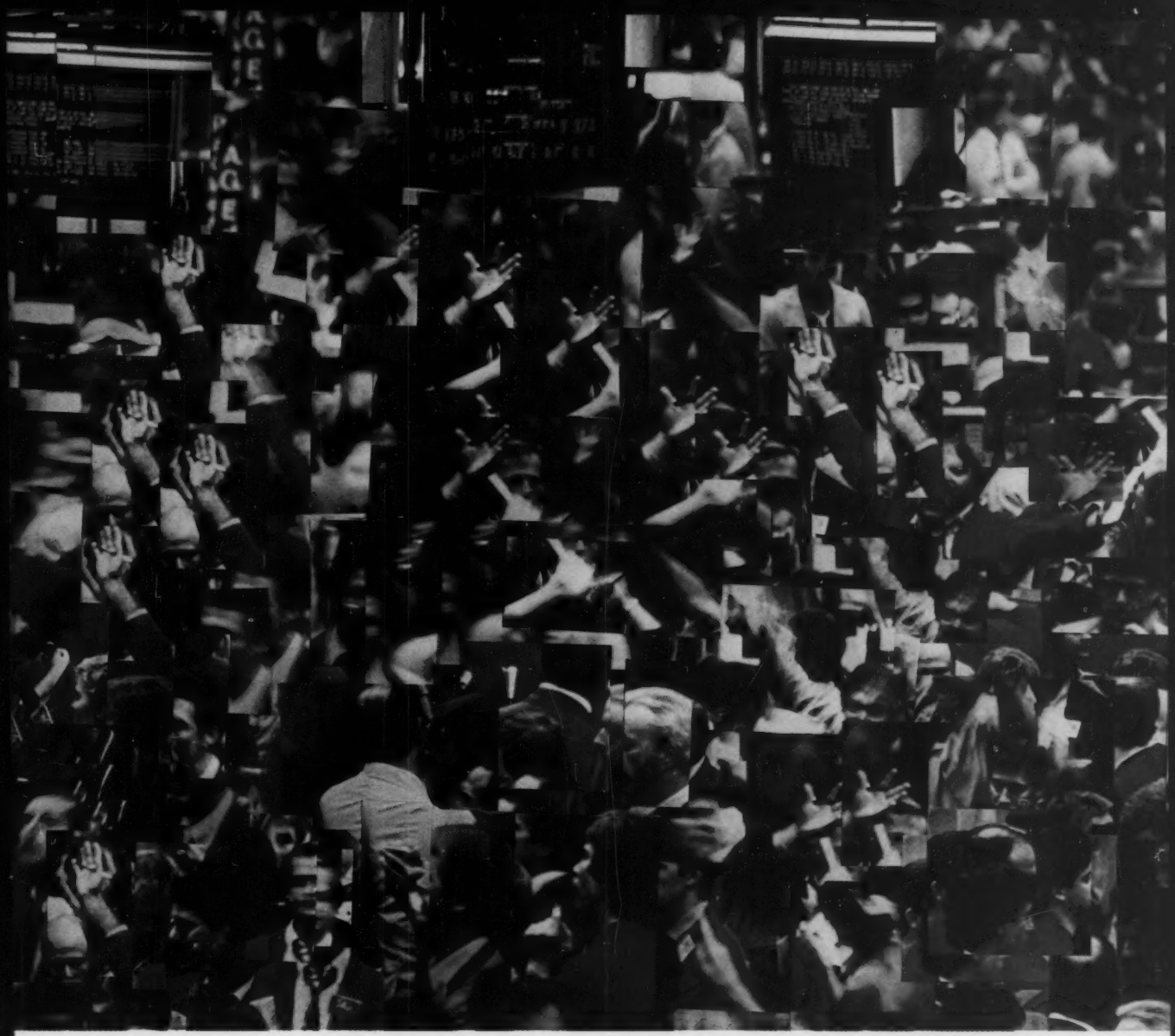

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NEW PRODUCTS

Tool lets PC, 370 share applications

The Aion Corp., of Palo Alto, Calif., has introduced an expert system application development tool for the IBM 370.

Called the Aion Development System/MVS, the product is said to be fully compatible with the Aion Development System/PC (ADS/PC), which supports IBM Personal Computers and compatibles. Available in August, the Aion Development System/MVS is priced at $60,000.

According to the vendor, applications built on a personal computer using the Aion systems can be used on a mainframe. The Aion Development System's open architecture reportedly allows for integration of existing data files and applications and also offers a generalized procedural escape to any callable routine.

Extended data structures can interface with other data bases and applications can be transported between the PC and the mainframe system.

Major features

Major features of the system include a series of real-time interactive editors with extensive Help features and a hierarchical outliner that enables developers to work on each part of a problem separately and then merge the results.

The system offers full screen, multiple-window interfaces, the vendor stated. Graphics include stacked bars and multiple lines as well as bars, pies and lines. Report generation language includes value substitution and formatting commands.

According to the vendor, the system can be used by software application builders with no prior experience in expert system-development because each system includes an application building component that includes all development functions needed to create, test and run knowledge-based applications.

Aion has also introduced a stand-alone execution system for the ADS/PC called the Aion Execution System/PC. The stand-alone execution system costs $750, according to Aion.

Software aids cell notation

Spreadsheet Auditor's copy protection removed

Consumer Software, Inc. of Gilroy, Calif., has released the Spreadsheet Auditor Version 3.0, said to integrate cell notation, interactive error checking, sideways printing and documentation. The company also removed the copy protection from the software.

The Spreadsheet Auditor 3.0 includes index commands for easier documentation and an interactive tutorial outlining the best way to design a sound spreadsheet, according to a spokesperson for Consumer Software. The Spreadsheet Auditor 3.0 is priced at $149.

The product's Cell Noter is said to allow users to attach a note to any cell in a spreadsheet. These notes can later be called up and viewed from within Version 3.0 or used as a random-access memory-resident utility with a Lotus Development Corp. spreadsheet.

The interactive checking feature of the Spreadsheet Auditor 3.0 allows users to test for common errors and highlight problem cells. The product also includes a split-screen function.

According to the company, customers who purchased the Spreadsheet Auditor Version 2.0 between April 1 and July 15 will receive an upgrade to Version 3.0 at no charge. All other registered users can receive the Spreadsheet Auditor Version 3.0 for $30, the vendor said.

Spreadsheet Auditor 3.0 runs on IBM Personal Computers and compatibles.

V-EMM offers virtual memory capability without EMS board

Fort's Software of Manhattan, Kan., has announced Release 2 of the company's V-EMM software package, designed to provide true virtual memory capability for various programs that support the Lotus/Intel/Microsoft Expanded Memory Specification (EMS).

Unlike the first release of V-EMM, which needed an EMS board to operate, V-EMM Release 2 will operate with or without EMS boards and with or without IBM Personal Computer AT extended memory boards.

According to the vendor, on systems with an EMS board installed, the virtual expanded memory is composed of real expanded memory plus auxiliary expanded memory provided by a hard disk drive.

On systems without EMS hardware, the virtual expanded memory is composed of simulated expanded memory plus auxiliary expanded memory.

In either case, up to 8M bytes of virtual expanded memory are available to EMS applications, according to the vendor. Simulated expanded memory is drawn from conventional memory and/or from the PC AT's extended memory. Release 2 also includes EMS random-access memory disk software.

Like virtual memory implementations on mainframe computers, V-EMM reportedly provides users with the illusion that they have more expanded memory than is actually installed in their computer.

V-EMM Release 2 is priced at $89.95. According to Fort's Software, current licensees of V-EMM can receive a free upgrade to Release 2 upon request.

Requirements for V-EMM Release 2 include an IBM Personal Computer, Personal Computer XT, AT or compatible; IBM PC-DOS 2.0 through PC-DOS 3.2; and a minimum of 192K bytes of conventional memory.

An IBM Fixed Disk Drive and Fixed Disk Adapter or compatible are required if a PC AT extended memory board is not present. The program also supports any EMS-compatible board, including Enhanced EMS boards and PC AT extended memory boards, the vendor said.

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Systems software

John A. Keane and Associates has ported its **QMS Programs** software for real-time statistical process control and quality information management to IBM 370 mainframes in the VM/CMS operating environment.

Composed of 46 quality-specific modules, QMS Programs provides applications in such areas as vendor ratings, defect analysis, instrument calibration, final inspection and batch release.

The software is available on Digital Equipment Corp.'s PDP-11, Microvax, VAX and Vaxclusters and will be available on IBM 4361 series in September. It ranges in price from $36,000 to $160,000.

John A. Keane and Associates, 575 Ewing St., Princeton, N.J. 08540.

Information Industries International has announced **EZ4U**, a productivity system for the IBM OS operating environment.

The EZ4U system features a programming language, including subscripted variables, string functions, automatic loop detection, IBM System Management Facilities extraction, built-in line printer graphics and linear regression and forecasting. EZ4U can be used to generate spreadsheets, write letters and create Gannt charts, bar graphs and populate and reformat files.

A site license for EZ4U is $5,500.

Information Industries International, P.O. Box 3278, Humble, Texas 77347.

MICROS

Software enhancements

Significant Statistics has enhanced its **Sigstat** statistical software package for IBM, Hewlett-Packard Co. and compatible personal computers.

The package has 34 added programs. They include cluster analysis, linear programming, statistical quality control, exploratory data analysis and nonparametrics.

Other added features include expanded capabilities for its range of basic data description, univariate and multivariate analysis of variance and covariance, general linear models, regression, multivariate, multidimensional scaling as well as time series techniques, according to the vendor.

The Sigstat package is priced at $595. Current Sigstat users can upgrade to the new version for $75.

Significant Statistics, 3336 N. Canyon Road, Provo, Utah 84604.

■

Master Computer Systems, Inc. has announced **Formix Version 2**, a language-independent, personal computer-based screen management system and software development environment.

Formix Version 2 is said to include such features as 45 additional screen functions in a panel-oriented environment. Formix Version 2 also includes a memory-resident executive to manage all screen processing on behalf of the application program, according to the vendor.

Formix Version 2 is written in assembly language.

Formix Version 2 costs $695.

Master Computer Systems, 9531 W. 78th St., Eden Prairie, Minn. 55344.

■

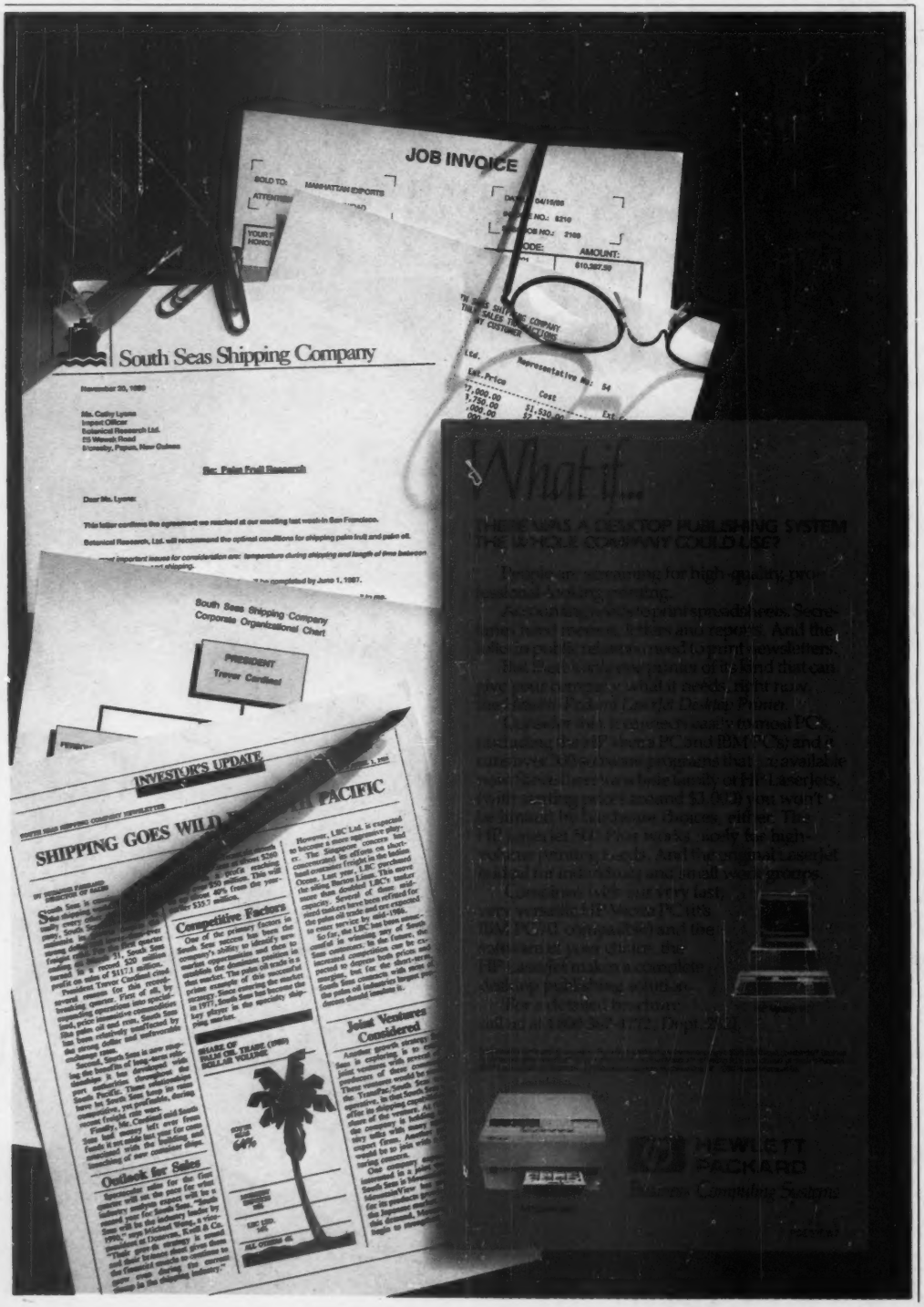
Newtek Industries has announced **Compu/Chart 2**, an enhanced version of its market-trend analyzer and technical analysis program for Digital Research, Inc. CP/M-based and Microsoft Corp. MS-DOS-based microcomputers.

Compu/Chart 2 is said to create and maintain any number of data files on investment instruments for a base period of 144 points, which may include 144 price entries and 144 volume entries in addition to other data that relates to trading action and plans.

According to Newtek Industries, Compu/Chart 2 generates market analysis tools in the form of 14 different charts, status reminders and alerts. The program is also said to generate on-screen interpretation texts.

The Compu/Chart 2 analysis program is priced at $199.95.

Newtek Industries, P.O. Box 46116, Los Angeles, Calif. 90046.



COMMUNICATIONS

Controllers

Western Telematic, Inc. has introduced the **RAB-14 switching system.**

The switching system is said to electronically switch up to 196 independent AB switches. According to the vendor, it can be used for switching between separate computer systems, single lines or for switching groups of lines between multiplexers or modems.

The system consists of individual channel modules that switch seven RS-232 lines between ports A and B and a common port C and a control rack that controls the power supply and control logic.

RAB-14 switching system costs $150. The control rack costs $550.

Western Telematic, 2435 S. Anne St., Santa Ana, Calif. 92704.

Protocol converters

Bridge Communications, Inc. has introduced its **Communications Server/1-3270** (CS/1-3270), said to permit the connecting of IBM 3270 terminals to both IBM and asynchronous host computers over an Ethernet local-area network.

CS/1-3270 reportedly increases flexibility in the IBM-only environment by substituting local networks for IBM cable multiplexers and enabling IBM terminals to connect to alternate IBM hosts by using the network's data-switching features.

The CS/1-3270 can be configured with up to four 8-port SIO/78 modules, for up to 32 connections.

The CS/1-3270 costs $20,000 for a maximum 32-port configuration.

Bridge Communications, 2081 Stierlin Road, Mountain View, Calif. 94043.

SYSTEMS & PERIPHERALS

Processors

Digital Electronic Systems has introduced its **Computerist Mainframe** 32-bit computer system.

The Computerist Mainframe system includes a small computer system interface, 1M byte of random-access memory, a real-time clock, seven interrupt priority levels, seven-bus master arbitration, two RS-232 ports, one Centronics Data Computer Corp. printer interface, a floppy disk controller and floppy disk drive. Options include an IEEE floating-point coprocessor, a paged memory mapping unit and a 16M-byte memory board.

The Computerist Mainframe system is priced at $5,000 for one to nine users.

Digital Electronic Systems, 302 S. Main, Estill Springs, Tenn. 37330.

Graphics systems

Omnicomp Graphics Corp. has introduced the **Omni 2000 GDS** graphics display system designed for Intel Corp. Multibus II systems.

The Omni 2000 GDS has a 1,280-by 1,024-pixel display resolution and monochrome to true color from a palette of 16.7 million colors.

A minimum Omni 2000 GDS configuration consists of two modules. The system's display list memory can be configured from zero to 16M bytes. Each Omni 2000 GDS also provides for direct-memory access, programmed parallel I/O and serial RS-232 interfacing.

The Omni 2000 GDS costs from $9,500.

Omnicomp Graphics, 1734 W. Belt North, Houston, Texas 77043.

■

Digital Equipment Corp. has added a **two-screen configuration** to its Vaxstation II/GPX workstation.

The configuration consists of two consoles running on a single Microvax II processor. The configuration can either be used by two users or by a single user in dual display mode. In the two-user version, each user gets a dedicated graphics coprocessor and window manager.

The two-screen Vaxstation II/GPX configuration includes a Microvax II processor with floating-point unit, 5M bytes of memory, two 8-plane graphics coprocessors and two 19-in. color monitors.

The two-screen Vaxstation II/GPX configuration costs $48,700.

DEC, 146 Main St., Maynard, Mass. 01754.

PRICE REDUCTIONS

Vectrix Corp. has announced price reductions for its **VXPC graphics board sets** and the **VX384 graphics controllers.**

The price of the VXPC graphics board, said to display 512 colors from a palette of 4,096, has been reduced to $1,995. The VXPC graphics board, said to display 512 colors from a palette of 16.8 million colors, now costs $2,495.

The reduced price for the VX384 graphics controller is $3,295.

Vectrix, 2606 Branchwood Drive, Greensboro, N.C. 27408.

■

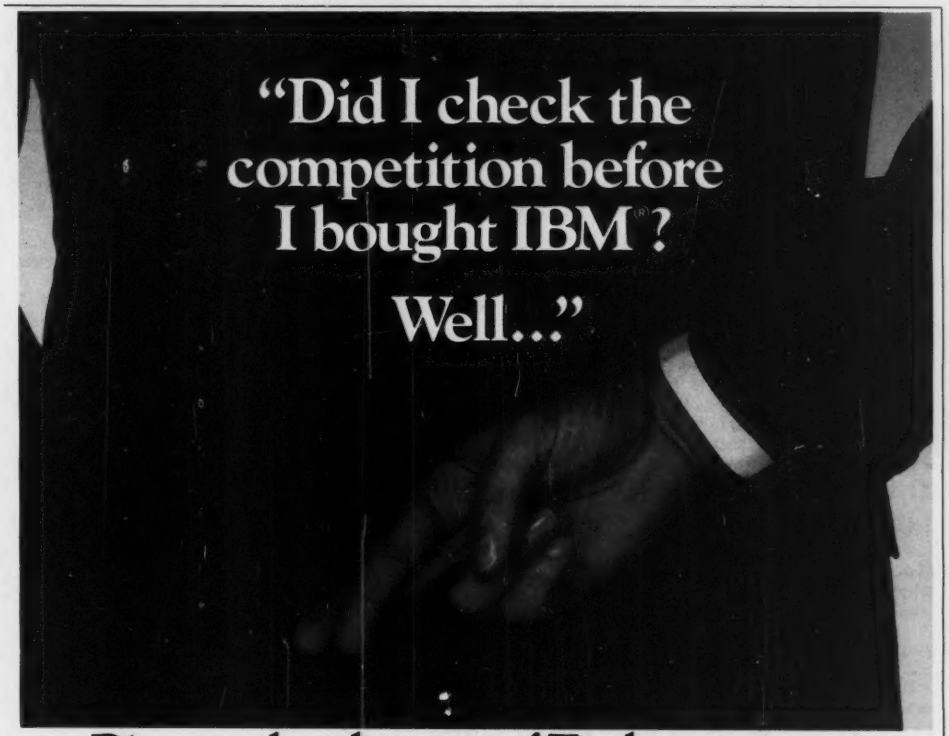
Spur Products Corp. has reduced the price of its IBM **1403-N1 printer** and **1403-N1 printer controller.**

The 1403-N1 printer controller enables mainframes and minicomputers to drive the 1403-N1 high-speed impact printer said to print 1,100 line/min.

The 1403-N1 printer controller with computer interface now costs $9,000.

The price of the remanufactured 1403-N1 printer has been reduced to $4,000.

Spur Products, 13469 Beach Ave., Marina Del Rey, Calif. 90291.



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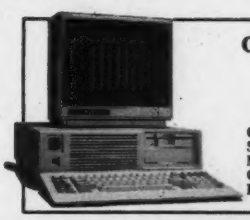

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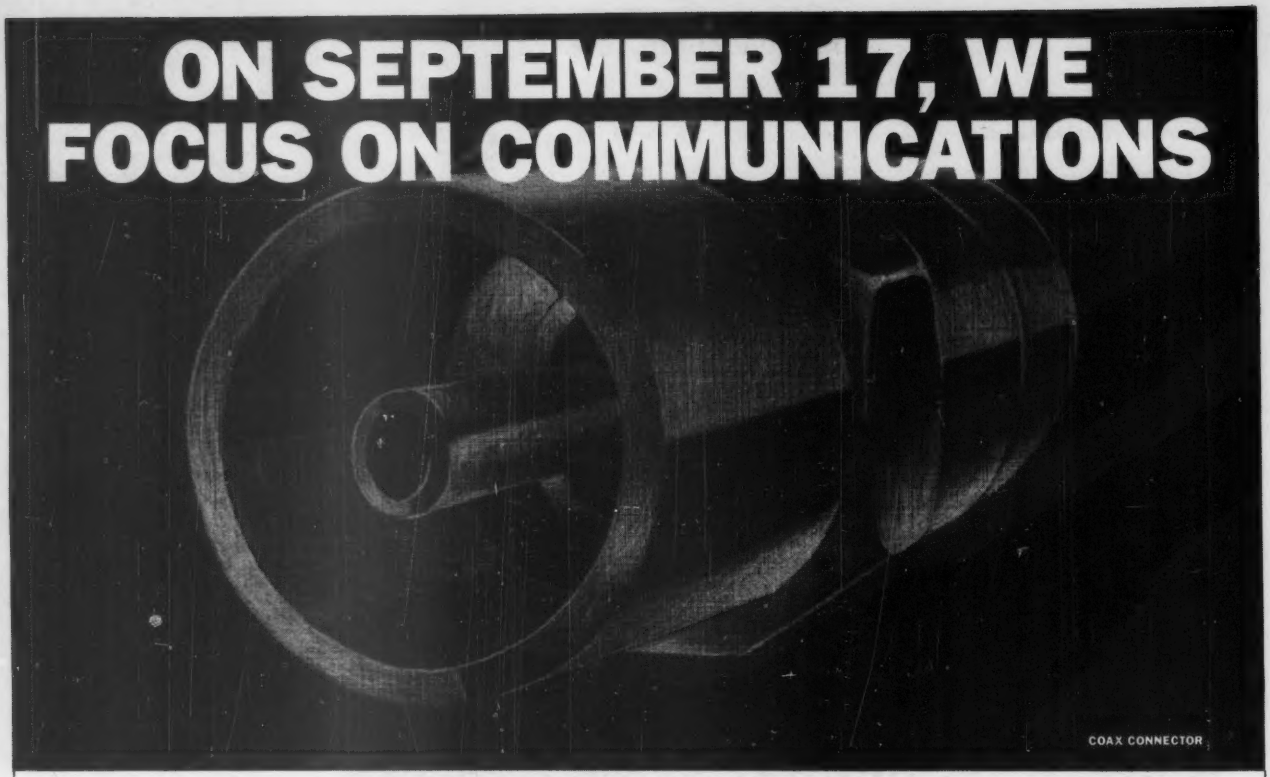

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For more information, contact Ed Marecki, Vice/President Sales, Computerworld Focus, 375 Cochituate Rd., Framingham, MA 01701-9171, (617) 879-0700. Or call your local Computerworld sales representative.

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COMPUTER INDUSTRY

Section begins on page 118

Walker steps into the black with $1.5M Saudi Arabian deal

Defense pact helps firm regain a profitable path

By Maura McEnaney

SAN FRANCISCO — After a year of being buried in the mire of layoffs, organizational changes and financial losses, Walker Interactive Products, Inc. appears to be resurfacing.

The financial application software company, which reportedly was unsuccessfully put up for sale late last year [CW, Sept. 23], recently announced a $1.5 million contract with Saudi Arabia's Ministry of Defense and Aviation for sales and service of its General Ledger, Accounts Payable, Purchase Order and Inventory applications. It was the largest sales contract in the company's history.

The contract was welcome news to Walker, on the verge of bankruptcy after liabilities grew and sales dropped from $20 million in 1984 to $10 million in 1985. "We really are back after the financial difficulties we had in 1985," says Craig Carlson, executive vice-president and general manager responsible for Walker's U.S. operations.

Launched as a consulting company by software entrepreneur Jeff Walker in the mid-1970s, the company attracted large venture capital investments and was reborn as Walker Interactive Products in 1980. It soon earned a strong reputation for its interactive software architecture.

Revenue leaps to $20 million

A heavy emphasis on fast growth and marketing pushed revenue from $1 million in 1980 to $20 million in fiscal 1984. But users and analysts admit those years also saw Walker lose its technical edge in the marketplace.

Unable to handle the expansive growth, the firm began having problems with its software releases, and sales began to slip. In fiscal 1985, revenue fell to $17 million and high expenses left the company with a substantial loss; Walker, a privately held company, would not disclose the amount of the loss.

"There were a lot of problems with Release 14 [of General Ledger]," says Randall McDonald, manager of financial analysis systems for the Ministry of Lands, Parks and Housing in Victoria, B.C. "It needed fixes during the installation, which made it seem as though it was not thoroughly tested."

Walker executives are quick to admit the same problem. "In 1984 our shipment was poor, and we weren't turning around product fixes," Carlson admits.

About a year ago, Walker's venture capital dried up, and financial troubles mounted. Walker was ousted and investors brought in Bruce Coleman, president of systems software firm Boole & Babbage, Inc., with the hope that he would sell the troubled software firm.

Although speculation centered on a possible purchase by Cullinet Software, Inc., Management Science America, Inc. or McCormack & Dodge Corp., a buyer never materialized. Coleman did restructure the company, closing its sales offices and trimming its work force to 85 employees.

In December he returned to Boole & Babbage, but he continues to serve as Walker chairman. While Carlson oversees the U.S. office in San Francisco, Walker President David Brownlee operates out of a 15-man office in the UK.

With a pared-down staff and a resurrected interest in software development, Walker says it turned a profitable quarter for the quarter ended March 31 — the third profitable quarter in the history of the company. The Saudi contract will figure substantially in a profitable second quarter ended in June, Carlson says. Sales this year will be flat at about $10 million.

'Revamped our products'

"We've gone through and significantly revamped our products," Carlson notes. "We're delivering products that really work, are easier to install and better documented."

Users of Walker software have been awaiting Version 4 of its Accounts Payable and Purchase Order applications. The release, which now provides users with the same utilities as General Ledger, is available in Canada and the UK and is expected to be announced in the U.S. by the end of the year, he says.

Walker users also say they have noticed some changes in the software firm. "When we get a product, it installs a lot better," McDonald says. And, although the Canadian Ministry has been anticipating Release 4 of the new products, "Two years ago we could have pressured them into giving it to us whether or not they were ready. Today, they are not going to crumble under our pressure."

Despite these changes, some analysts are skeptical about Walker's chances for success in the marketplace.

"If they are simply going to try to get into the market with their old products, that will not be enough," says William Shattuck, analyst for Montgomery Securities. "There are some fairly major structural changes going on in application software. The market needs distributed applications. More bells and whistles on the same engine is not going to be enough."

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IBM earnings slide again

From page 118

"Since costs are lumped into a single sum, it's hard to tell whether it's product or overhead costs that are the problem," noted Bob Djurdjevic of Phoenix-based Annex Research. "We won't know until IBM releases its 10Q later in the quarter."

An IBM spokeswoman said selling, general and administrative expenses in the U.S. were down in the first six months of 1986 from last year. She declined, however, to quantify the amount.

In a prepared statement, IBM Chairman John Akers re-emphasized earlier assertions that IBM is tightening discretionary expenses. "We continue to manage our business prudently and control costs, expenses and resources."

Akers stressed that the mediocre financial results will not alter the firm's strategy. "We are managing the business for the long term and believe our investments in research, development, plant and equipment will prepare us for future business opportunities."

Work force decreasing

In that regard, he added that while IBM continues to decrease its overall U.S. work force through attrition, it is adding more people to its domestic marketing organization.

The IBM chairman noted that the second-quarter results reflect the continuation of the business slowdown in the North American economy that began in 1985. "Sluggish capital spending in North America and uncertainties about U.S. tax reform legislation and transition rules have negatively affected our orders and shipments," he explained.

Repeating a statement made at an analyst meeting in San Jose, Calif., last month, Akers said that unless capital spending in North America improves, it will be extremely difficult for IBM to show earnings growth in 1986.

Annex's Djurdjevic said IBM would be hard-pressed to repeat last year's strong fourth-quarter performance when it finished with earnings slightly beneath 1984's results after warning of a potential severe shortfall.

"It's going to be harder this year because they're not finishing off a ramp up of the 3090," he explained, adding that in the fourth quarter, IBM will have Amdahl Corp. and National Advanced Systems Corp. to contend with.

Based on first-half results, Hutton's Geran said he is revising his 1986 and 1987 earnings estimates downward. He now expects IBM to earn $10.02 a share this year and $12 a share in 1987, down from his earlier estimates of $11 and $13.25 a share, respectively.

"That means down third and fourth quarters," he said. "It won't be until at least the first quarter of next year that IBM gets out of this mess.'

Akers said that while worldwide orders and shipments were below last year's first half, demand for large processors and storage devices remains firm. The firm declined to say which product areas were most affected by soft demand or to quantify order and shipment levels. The spokeswoman did say, as in the first quarter, that the 3090, 4381 and Personal Computer AT were "doing well."

Weak dollar beneficial

The weakening value of the U.S. dollar had a beneficial impact on first-half results, IBM said. The lower value, compared with last year's rates, improved 1986 aggregate revenue by $2.08 billion and increased net profits by $325 million, IBM estimated.

Robert Fertig, president of Enterprise Information Systems, a research firm in Stamford, Conn., contended that the worst for IBM may be over.

The firm, he said, is entering a marketing mode with many of its new products, such as its mid-range processors, soon entering production. Price cuts across IBM's product line, while hurting profitability, have effectively stimulated revenue, he noted.

"IBM has also completed a management reorganization, begun in the fourth quarter, that was expensive and caused many of its marketing people to move all over the place and caused some salespeople not to make quota," Fertig added.

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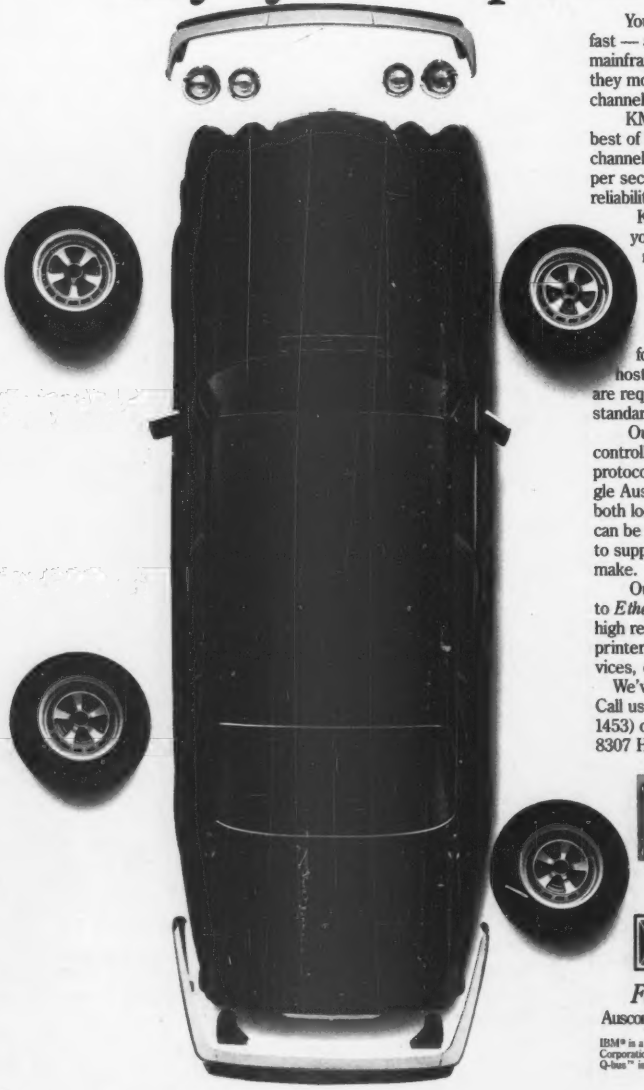

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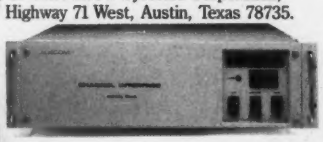

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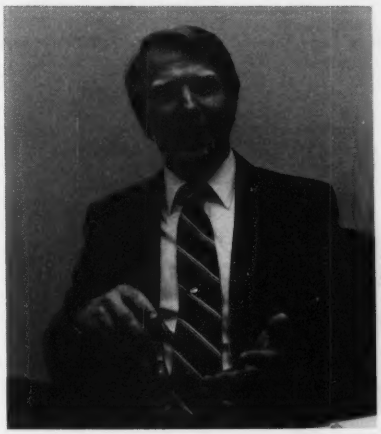

Bjorn Nordemo
Vice President
Data Arts & Sciences, Inc.
Weston, MA

Bjorn Nordemo is Vice President of Data Arts & Sciences, Inc. (DASI), a contract software agency based in Weston, MA. Although they place people in permanent positions, DASI most often places 'contract programming personnel' — consultants who fit special niches for short or long term commitments in corporations in the New England area.

"Our agency specializes in finding computer consultants — designers of systems, evaluators of hardware and software requirements, and computer programmers to mention a few. We recently were introduced to Computerworld as a potential source for finding these consultants," states Bjorn. *"I liked the idea because I know Computerworld has a broad reach — from MIS/DP directors to computer programmers, in multiple industries and multiple markets — and that's what DASI needs."*

"We had four specific positions for MIS/DP consultants that we needed to fill in northern New England. We used the local newspaper on a weekly basis, but people who are willing to move usually aren't reading the local Sunday paper. So, I felt this was a perfect opportunity to try Computerworld," says Bjorn.

According to Bjorn, he's quite satisfied with the results. *"From Computerworld, we filled 75% (3 out of 4) of the positions with the responses from the first week, and the remaining position with the response from the following week. These results alone made my ads in Computerworld worthwhile."*

And Bjorn also recognizes a second benefit to advertising in Computerworld. *"The beauty of using Computerworld is that it's read by people in the computer industry who have a need for consultants, as well as being read by consultants who need to keep up to date on the marketplace,"* says Bjorn. *"So we not only reach qualified candidates to fill our current openings, but we are creating awareness of the services that DASI has to offer,"* says Bjorn.

"We have some great plans for expansion and as we do, Computerworld is going to play a strong hand in helping us accomplish our goals," concludes Bjorn.

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A PUBLICATION OF CW COMMUNICATIONS

Dole bill prompts ringing opposition to Bell deregulation

Stifling competition, cross-subsidation feared

By Mitch Betts

WASHINGTON, D.C. — Communications equipment and service vendors fear that the regional holding companies will be formidable and unfair competitors if the U.S. Congress or federal regulators allow the baby Bells to enter their markets.

In a flurry of letters to Congress, the vendors have urged legislators not to allow the Bell operating companies into the three markets prohibited by the AT&T divestiture agreement: information services, equipment manufacturing and long-distance services.

The focus of the lobbying blitz is a bill introduced by Sen. Robert Dole (R-Kan.) that would transfer the responsibility of regulating the regional holding companies from U.S. District Court Judge Harold Greene to the Federal Communications Commission, which has shown greater willingness to deregulate the regional holding companies [CW, June 30].

All of the opponents say they are convinced that the FCC would be quick to allow the holding companies to enter the new markets and that the companies would unfairly subsidize their business ventures with revenue from their regulated local telephone companies.

Some new long-distance ventures are concerned with being wiped out by the well-financed holding companies.

Such is the case with the National Telecommunications Network (NTN), a Rockville, Md.-based joint venture of seven regional telecommunications firms developing a nationwide fiber-optic network.

It is worried that the regional holding companies would form a consortium that would duplicate NTN, according to Joel H. Maloff, director of marketing.

"Obviously, we feel that is unfair, since they would be able to use their monopoly position to subsidize that kind of venture," Maloff says. "Even the possibility of such a network would be deadly for us, because we do not have the financial capital to compete with an armada like that," he adds.

Other opponents

Other opponents in the industry include the North American Telecommunications Association, the Independent Data Communications Manufacturers Association and other groups of equipment vendors, as well as ADAPSO, a computer services and software industry association.

By pursuing a strategy of cross-subsidization, ADAPSO explains, the regional holding companies could charge artificially low prices for their new services and charge competitors unjustifiably high rates for access to the local Bell network. The regionals could also manipulate the availability and quality of the communications services upon which their competitors depend, ADAPSO says.

The regional holding companies, in their own lobbying efforts to support the Dole bill, argue that the current regulatory scheme is too burdensome and that it prevents them from offering competitive services.

Moreover, they argue that federal and state accounting regulations will prevent any cross-subsidization.

Industry analysts predict the holding companies would enter the information services market first because of their existing local distribution network.

"If they get into the information services market quickly, they will have a chilling effect upon the existing offerers and any potential offerers . . . simply because of their territorial power and existing facilities," comments Alan Pearce, president of Information Age Economics, Inc. in Bethesda, Md.

In the equipment market, the regional holding companies together would constitute one more competitor in a crowded and troubled market, analysts say.

Pearce speculates the regionals might acquire a private-branch exchange or other equipment vendor as the industry consolidates.

No immediate relief

But Pearce cautions that the Dole bill would not bring immediate relief to the regional holding companies, because the FCC would have to undertake a lengthy regulatory proceeding.

He says they might get faster relief from Greene and the Department of Justice.

George R. Dellinger, telecommunications analyst with Washington Analysis Corp., doubts Congress will have time to pass the controversial bill this year.

Furthermore, he says, the regional holding companies have not demonstrated a compelling need for the legislation, since they are financially healthy and are unable to immediately offer the services that deregulation could produce.

"The most likely market for them to enter is enhanced information services, such as voice mail. But even if they could get in tomorrow, they just don't have the equipment to sell that service now," Dellinger says.

What's missing from this picture?

COMPUTER INDUSTRY

EXECUTIVE CORNER

Theodore R. Joseph has been appointed president and chief operating officer of Phoenix Technologies Ltd., the new name for Phoenix Software Associates Ltd. **Robert F. Angelo** has been named vice-president of marketing.

■

Wang Laboratories, Inc. has announced several promotions. **Paul Guzzi** has been named to the position of senior vice-president for administrative services, and the following people have been promoted to the positions of vice-president: **Carl Brown** in U.S. sales and marketing, **Paul Demko** in research and development, **Larry Jones** in Wang Financial Information Services and **Eoin O'Driscoll** in manufacturing.

■

Ronald Rowe has joined Adaptive Computer Technologies as president and chief executive officer. He will be responsible for bringing the company's product to market, a result of Adaptive Computer Technologies' maturation from its research and development stage into its production stage.

■

Shosuke Kawai has been promoted to senior vice-president and chief of staff at Epson America, Inc. In this position, Kawai will be the chief liaison between Epson's management committees and the board of directors, as well as intermediary between Japanese employees in America and Seiko Epson Corp. in Japan.

■

Robert Shea, former senior vice-president of Paradyne Corp., has been appointed president and chief executive officer of Formative Technologies, Inc. of Pittsburgh.

Shea succeeds acting CEO **Sam Leinhardt**, who becomes executive vice-president and chief operating officer. Former president **Charles Eastman** has been named executive vice-president and chief scientist.

■

Joan Carlton has been promoted to vice-president within the computer services division at Interactive Data Corp. She will take over management responsibility for the Analystics Systems Group, which maintains and develops the software for the company's financial data bases.

Since joining Interactive Data in 1969, Carlton has held numerous management positions in the systems software department.

■

Mac Lewis has been appointed president, CEO and a member of the board at Computer Network Technology Corp. in New Hope, Minn.

Prior to joining Computer Network Technology, Lewis founded The Systems Center, Inc. in Dallas. He also spent 14 years with IBM, where he held several positions in sales, marketing and product planning.

■

Gerald W. Thames has been named vice-president of communications systems for Martin Marietta's Information and Communications Services company.

Previously with AT&T for 15 years in key engineering, marketing and sales management positions, Thames will be responsible for all telecommunications and commercial communications markets for the Information and Communications systems. He also has corporatewide responsibilities for communications.

■

Stephen E. Cooper has been promoted to president and chief operating officer of Silicon Systems, Inc. Cooper joined the company in 1980 as vice-president of wafer fabrication after working for seven years at Intel Corp.

■

Alfred T. Duncan, previously head of Commodore International in Italy, France and Belgium, has been named CEO of Victor Technologies, Inc. He replaces **Eric Hass**, who has left to pursue new opportunities. **Paul Mahoney** also has joined Victor Technologies as vice-president of sales and marketing.

■

John A. Sasso has been named chief executive officer of Esprit Systems, Inc. Sasso is a founder of the company and has been president, chief operating officer and treasurer since Esprit was formed in 1983. On an interim basis, **Anthony P. Palladino** will continue as chairman and chief financial officer.

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Bell companies sued, misappropriation cited

REDWOOD CITY, Calif. — A communications software company is suing Bell Communications Research Corp. over alleged trade-secret and federal antitrust violations.

American Telecorp is seeking $50 million from Bell Communications Research, several regional holding companies and local operating companies for what it claims is misappropriation of its Cenpak communications software.

The suit, filed in U.S. District Court in San Francisco, claims Bell Communications Research is unlawfully using American Telecorp's "move and change" software.

The software is said to allow companies with Centrex to automatically change telephone locations and let users keep their own extensions without the help from a telephone company repairman.

According to American Telecorp attorney Joseph Alioto, Bell Communications Research is proposing to distribute the software for use to several of its subsidiaries.

A Bell Communications Research spokesman declined comment pending a detailed review of the suit.

— Maura McEnaney

Hit list: Top 10 cliches

From page 118

to develop and service state-of-the-art products."

But if the company has had to bite the bullet with layoffs and other cost cuts, then the line goes, "We have streamlined our operation for maximum efficiency and reduced our break-even point."

3. The "industry-standard" benchmark test of the week. The wars over MIPS and MFLOPS and Whetstones can become meaningless to the point of absurdity. One vendor's CEO said that the user cares only about the time it takes to run his particular application.

4. "We talk to our customers." This is usually followed by the number of miles logged by the CEO in the last six months visiting customer installations. Nothing really wrong with any of that — but dinner with the CEO is no substitute for a quick trip from the field service rep when needed.

5. The explanation for acquisitions. "You can't sit still in this industry. We continue to aggressively expand our business and pursue new market opportunities to enhance our current product line to offer a full-service solution [yes, that word again] to the customer."

6. The explanation for divestitures. This often comes from vendors that were big proponents of No. 5 just a couple of years before.

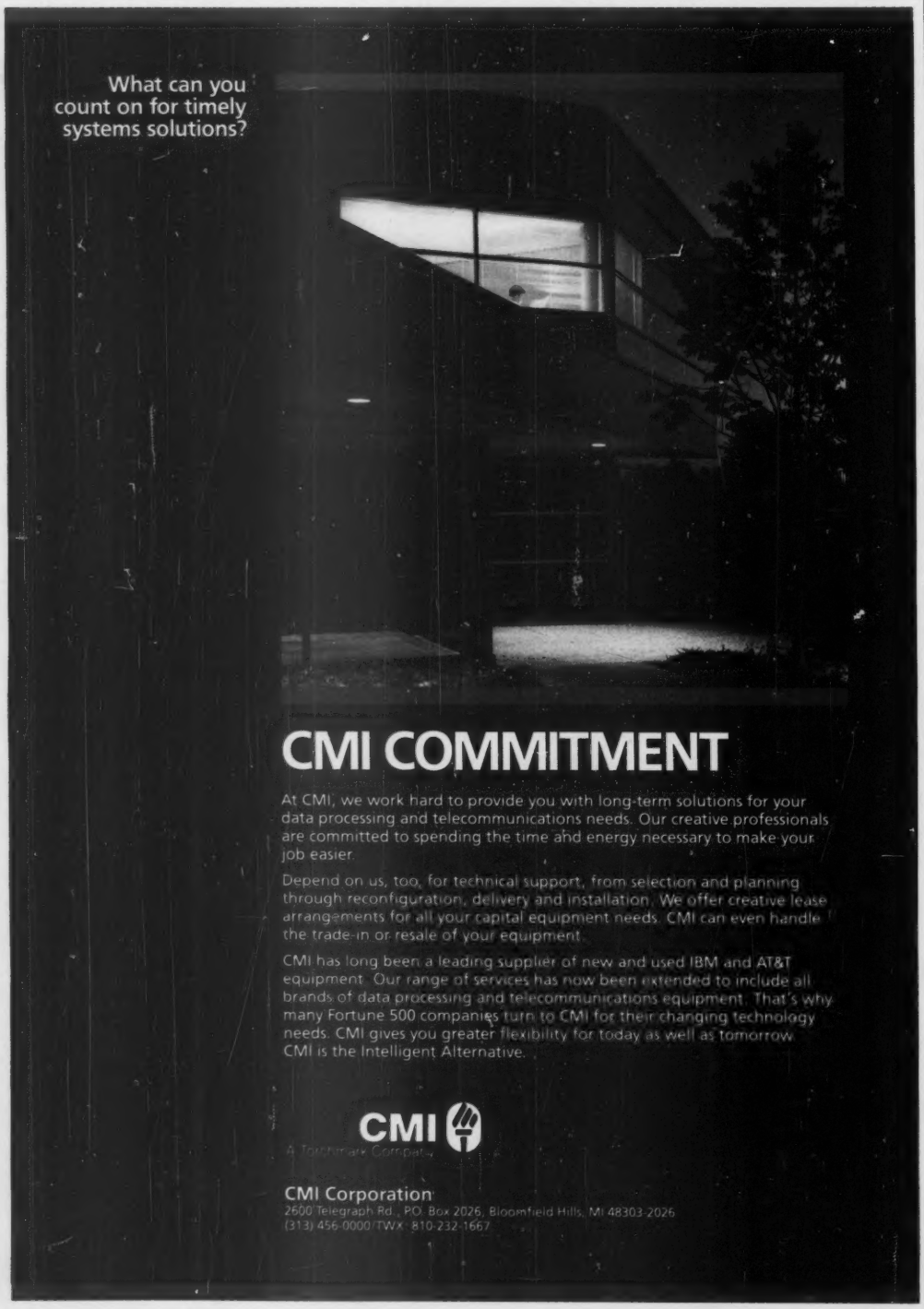
"We had lost sight of our central purpose. But we have refocused on our core businesses, returned to our roots and pared operations not germane to our corporate mission. We have remembered who our target customers are, and we are dedicated to serving them."

7. "We are committed to the Fortune 50/100/500/1,000/2,000 market." A sale to a huge company may be prestigious and make a nice spread in the annual report, but there are hundreds of solid and successful vendors doing fine without hyping that fact. Zenith Data Systems Corp. was considered a micro industry sleeper because it sold mainly to the government and education; now everyone wants to emulate Zenith's success.

8. "We are committed to being the industry's low-cost, high-volume producer." This list had to include one entry specifically from IBM. What Big Blue usually doesn't add is that a record amount of that volume sits in the warehouse, unsold.

9. "Despite the record industry slump, customer interest in our new products is at an all-time high." Translation: We can't seem to be able to sell anything, and we don't know why.

10. (In memory of Herbert Hoover) "Although the economy has been sluggish, we expect business to turn up in the second half of the fiscal year." This is usually a far enough horizon that if the prediction doesn't come true, the vendor can dismiss it as "our best-case scenario," blame the economy or foreign currency differentials and probably avoid shareholder suits.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"I need to reach both the MIS/DP *and* data comm manager. With Computerworld, I do."

Sharon Paster
Advertising Manager
Codex Corporation

Sharon Paster is Advertising Manager for Codex Corporation, a wholly-owned subsidiary of Motorola, Inc. As a supplier of integrated network systems for use in large corporations, Codex markets a broad range of products, including modems, multiplexers, communications processors, network management systems, and local area networks.

To increase company awareness and establish preference for Codex products, Sharon has chosen Computerworld as a primary advertising vehicle. The reason? Circulation and readership.

Sharon recognizes the important roles played by the MIS/DP manager and the data communications manager in large-volume purchasing of Codex products. *"Our primary customer is the data communications manager. But that person often reports to the MIS/DP manager, whose influence in the purchasing of data communications has been increasing over the last few years,"* she explains.

"Many times both the MIS/DP manager and the data communications manager are involved in the purchasing process. Sometimes, depending on the company size, it's either one or the other," notes Sharon. *"So I need to reach both the MIS/DP and data comm manager. And, with Computerworld, I do."*

As for readership, Sharon has conducted studies over Codex's customer base and found Computerworld to be extremely well accepted. *"Of our customers who are responsible for both data processing and data communications, Computerworld is the best-read publication,"* claims Sharon. *"And, for those customers who are responsible for only data communications, Computerworld is the first publication they look to after the leading data communications publication."*

Further proof of Computerworld's credibility is the high response rate to the Codex 800 number in its ads. *"The responses bear out all my research,"* says Sharon. *"Computerworld tops both its MIS/DP competition and the data communications publications as far as quality and quantity is concerned. Computerworld generates the largest number of high quality phone leads from large-volume buyers. And that's exactly what Codex is after,"* she concludes.

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Jubilation

Word-a-holics unite!

Trying to decide which word processor to buy is like trying to decide which college to go to. The decision will change your life forever, but you may never know if it was the best one. Here are five tried and proven professional packages. They all have spell checkers. None are copy-protected. And hard drives are recommended for all. See PC Magazine 1/28.

MultiMate Advantage 3.6 with Graphlink and On-File $289
Originally designed to emulate the WANG word processor, MultiMate is often referred to as the corporate word processor. It offers sophisticated networking capabilities, and, with two free-for-a-limited-time software programs (Graphlink and On-File), also has built in graphics and database.

MicroSoft Word 3.0 with Outline $247
With a mouse and a graphics card, MicroSoft Word lets you move words around without touching the keyboard, and see what you got without squinting. Without a mouse or a graphics card it's still a powerful word-processor, with "Style Sheets" that simplify formatting, and a built-in outline program.

WordPerfect 4.1 ..... $239
We have a friend who writes for computer magazines. At one time or another he has used and reviewed virtually every major word processor. He now swears by WordPerfect and swears at all the others. Use this program for a while and you'll be able to touch type most of your commands with your eyes closed and your right hand tied behind your back.

WordStar 2000 Plus Release 2 ..... $285
WordStar has had some trouble shedding its image as the lumbering dinosaur of the microcomputer age. But hundreds of thousands of people use it. There are a lot of programs out there to back it up. And this new version gives it the same advanced features as any top-quality word processor. Even the control keys are starting to make some sense.

Volkswriter 3.0 ..... $147
Solid performance with a reasonable price continues to be Volkswriter's claim to fame. It's fast, and boasts one of the original what-you-see-is-what-you-get screens. With the new version's spell checker and more sophisticated print formatting, it is now able to compete functionally with the other high-end word processors. (Our new low price is pretty persuasive too).

Buy one. Get two.

Hey, got a friend? Don't know? Check your database! What? No database? Have we got a deal for you (and your friend). Until June 30, Microrim will send you a *complete* second copy of R:base 5000 free when you send in your warranty card and a copy of our sales invoice. So you can get together with your friend, split the cost for one and get two! Or, you can keep the extra copy at home, at a branch office, or down the hall. R:base 5000 is easy to learn and operate, and has the custom reporting features most users need. Remember, the two for one offer is only good from April 15 till June 30.

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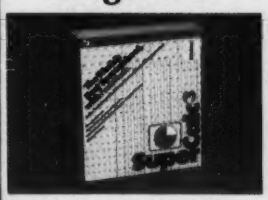
128k or 256k (150Ns)	$39 ea. set

Bernoulli Berserk!

We've got a problem. The prices we're able to offer on Bernoulli boxes are changing about 10 times faster than we can change this ad. Probably because the machines are selling about 10 times faster than anyone ever dreamed they would. The 20 Meg and 40 Meg versions feature two ½ height drives with removable cartridges. There's a 90 day warranty, and we're an authorized Bernoulli service center—turn-around on repairs is usually 24 hours. Here are our latest up-to-date-but-probably-obsolete-by-now prices!

Bernoulli Box 40 Meg $2499
Additional 20 Meg Cartridges $69
Bernoulli Box 20 Meg $1999
Additional 10 Meg cartridges $51
Bernoulli Care Kit $79

Supercalc ifragilistic!



SuperCalc 3 is the kind of product that you'd be proud to bring home to your mother. Like Lotus 1-2-3 it offers spreadsheet, information management and presentation graphics. But it only needs 128k of RAM, and is not copy-protected. It also is compatible with the Hercules Monochrome Card, as well as the Enhanced Memory (EMS) and Enhanced Graphics (EGA) standards. And you get a free copy of Sideways, the program that lets your printer think horizontal is vertical.

SuperCalc 3 2.1 (with Sideways) .....
30% off our usual unusual low price—call!

SixPakPlus Minus$!

AST is so wrapped up in Enhanced Memory and other arcane subjects that they've been letting the price slip on their original claim to fame—the AST SixPakPlus, one of the original and best multifunction cards. So if you're just starting in computing, or outfitting a second unit for home, now's a great time to buy this basic piece of hardware. You get a clock calendar, serial port, parallel port, up to 384k of memory, *and* copies of two classic unprotected programs—Sidekick 1.5 and DESQView. A genuine deal.

SixPakPlus 64k $169
SixPakPlus 384k (fully populated) $219

Herculean rebate!

The Hercules monochrome graphics card has saved hundreds of thousands of PC owners from terminal myopia, by supplying crisp clean monochrome graphics. The Hercules color card is the industry standard for color graphics. Both come with a parallel printer port, and a *full two year warranty.* And from May 1 through August 31, Hercules is offering a $50 rebate on either card.

Hercules Monochrome Graphics Card $299
(and get $50 rebate from Hercules)
Hercules Color Card (1/2 slot) $159
(and get $50 rebate from Hercules)

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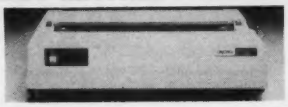

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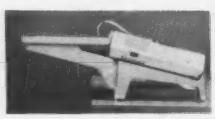

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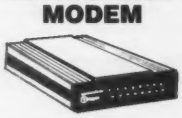

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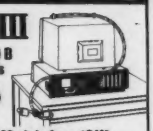

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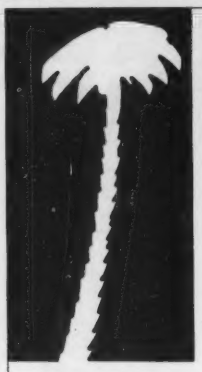

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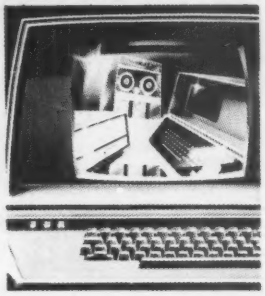

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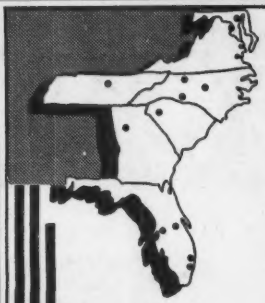

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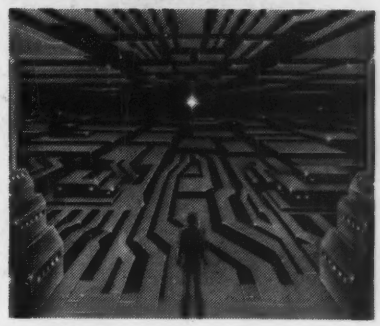

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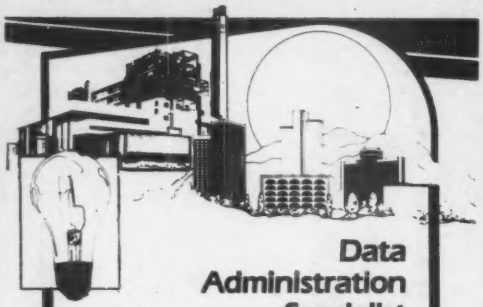

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The Academic Computer Center at Western Michigan University seeks a Programmer/Analyst - Graphics support - to plan, prepare, and present workshops on various Graphics Software; provide Graphic Consulting Services; develop graphics programs and applications; coordinate and monitor with Graphic Lab, and to knowledgeably participate in the academic computer center planning process. Good communication skills are required. Formal education in Computer Science or related field is required. Qualified candidates should send their resumes to: Ms. Victoria Blackmon, Manager of Employment Services, Personnel Department, Siebert Administration Building, Western Michigan University, Kalamazoo, MI 49008. Reference posting Number 85-597. WMU is an EEO/AA employer.

ADMINISTRATIVE COMPUTER CENTER

University of Maryland College Park

College Park, with a student enrollment of approximately 37,000, is the graduate-research-land grant campus of the University of Maryland. The Administrative Computer Center (ACC) has the responsibility of providing computing support for the administrative function of the campus. The ACC, with an annual budget of nearly $4 million and approximately 70 employees, reports to the Assistant Vice Chancellor for Administrative Affairs. The ACC is in the process of a major computing resource upgrade which will involve installation of a large IBM-compatible mainframe (a new environment at the ACC) and peripherals, a new DBMS, and significant amounts of application and end user computing software. Initial deliveries of hardware and software are scheduled for early 1987.

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This individual is responsible for managing the area of the ACC which provides application systems support to the administrative community at the College Park Campus. Such support includes consulting and acquisition, design, development, implementation, and maintenance of application software. This position is responsible for a staff of approximately 25.

Applicants for both positions must have a Bachelor's degree (preferred concentration in Computer Science or Business Management) and 5 years experience in computing demonstrating progressive growth and responsibilities. Salary is to the mid-$50's and will be commensurate with experience. Starting date is negotiable with preference for early Fall.

Please submit resumes, three professional references and indicate the position for which you are applying to: Ms. Marcia J. Boyd, Chairperson, Administrative Computer Center, Room 0105A Main Administration Building, University of Maryland, College Park, MD 20742.

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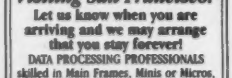

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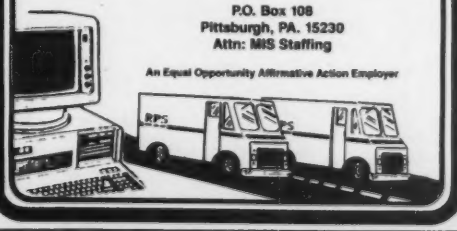

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Vendors report sluggish demand

From page 118

ed Stephen Dube, of Shearson, Lehman Brothers, Inc.

Burroughs Corp. Despite focusing much of its time and energy during the last two months on its acquisition of Sperry Corp., the Detroit mainframe maker was still able to post impressive gains in domestic orders, revenue and profits.

Burroughs' Memorex Corp. subsidiary showed improved order rates for the third consecutive quarter and "a slight profit." Its System Development subsidiary showed "substantial" gains.

While earnings for the quarter were up 41% to $76.2 million, much of the gain — $13.7 million — is a result of accounting changes and divestiture.

Sperry. Meanwhile, the Blue Bell, Pa.-based Sperry said merger costs will reduce profits from $44.4 million to $6.8 million, down from year-earlier profits of $51.5 million. Revenue increased 1.8% to $1.25 billion.

NCR. The Dayton, Ohio-based firm continued to record earnings and revenue gains despite the listless domestic economy. For the six-month period, net profits rose 17% to $129 million, or $1.30 a share, while revenue climbed 14% to $2.12 billion.

"They've done a good job on the cost-control side of the house, keeping expenditures in line with revenue," noted Jay Stevens, an analyst with Dean Witter Reynolds, Inc.

In a separate announcement, NCR said it enacted a stock provision designed to prevent a hostile takeover, even though it said it is not aware of any such plan.

Computer Consoles, Inc. The Waltham, Mass., office and communications systems vendor narrowed its losses in the second quarter, although revenue declined roughly 5% to $33 million from the year-earlier period. The firm's second-quarter loss of $886,000 was significantly less than the $4.6 million deficit totaled in the year-earlier period, while earnings increased almost 56% from the previous period.

Chairman John F. Cunningham said Computer Consoles' upward revenue trend, which is expected to continue in the coming months, should enable the firm "to resume profitability in the second half of 1986 and break even for the year."

Apple Computer, Inc. Chairman John Sculley said Apple's 20% sales gain and $32.3 million profits were attributed to inroads made by its Macintosh computer into the office environment and to the leadership position achieved by the Apple II in the educational market.

The firm, which lost $17.2 million in the corresponding quarter last year, said gross margins as a percentage of net sales were 52.7% and 53.1% for the quarter and half, respectively. For the nine-month period, net profits were up 66% to $121 million, although sales were off 13% to $1.3 billion.

Lotus Development Corp. Newly named Chairman Jim Manzi said the key factors in the firm's second-quarter results, which boosted first-half profits to $23.1 million, or $1.44 a share, on revenue of $135.4 million, were record demand for its 1-2-3 and continued growth in international markets. "We are exceptionally pleased with Lotus' financial performance and increasing strength of the worldwide market demand for our products," Manzi said.

Computer Sciences Corp. Despite start-up costs of various government contracts, the El Segundo, Calif.-based systems and service company turned in sales gains in each of its three major operating areas. A principal contributor to the overall 25% revenue gain was the Industry Services group, which reported a 70% increase in sales to $51.9 million.

Apollo Computer, Inc. Although profits of $1.04 million were still far below the $7.4 million that the computer-aided design and manufacturing systems vendor reported a year ago before it began to feel the impact of the slump, Apollo turned in its highest ever quarterly sales level at $88.4 million, which was up 8% from the first quarter of this year.

Chairman and Chief Executive Officer Thomas A. Vanderslice said higher volumes and added customers should produce greater profits in the future.

Oracle Corp. The Belmont, Calif., relational data base system vendor announced fourth-quarter sales of $20.8 million, a 146% increase over year-ago totals. Profits at the software vendor climbed to $2.6 million, or 17 cents a share, in the fourth quarter, compared with $1.5 million or 11 cents per share for the same period a year ago.

Sales for the fiscal year ended May 31 topped $55.4 million, a 139% increase over last year's $23.2 million. Fiscal 1986 profits were $5.8 million compared with $1.5 million in fiscal 1985.

Micom Systems, Inc. The Simi Valley, Calif.-based maker of data communications equipment is singing the familiar industry refrain: Weak capital economic conditions are hurting sales and profits.

Although sales in the period — $46 million — were negligibly below those in the corresponding period last year, profits were down to $1.6 million from $2.4 million. Chairman Roger Evans said soft sales of the firm's data private branch exchange had adversely affected results.

Service firms buck slump, stand tall with 20% growth

ACTIVE ISSUES
Kathy Porteus

Against a backdrop of ho-hum computer industry conditions, professional services companies are humming with activity. Stocks such as Computer Sciences Corp. (CSC — 34¼) and Planning Research Corp. (PLN — 18⅜) are being described, in Wall Street jargon, as "exciting stories."

Professional services companies provide customers with outside expertise in automating new applications and integrating systems. Professional services have traditionally meant "loaning out" programmers. Today, many companies offer comprehensive, value-added services that are contracted by a commercial customer or government agency for several years.

Professional services companies have attracted investor attention because of their apparent immunity to sluggish economic conditions, greater earnings visibility from longer term contracts and participation in a market that, by most accounts, is growing 20% annually.

Analysts say the Gramm-Rudman-Hollings legislation should not significantly alter business for service companies such as Computer Sciences that are heavy government contractors. Most analysts also expect professional services to be a major beneficiary of tax revision.

How should an investor play this group?

According to Stephen T. McClellan, vice-president with Merrill Lynch, Pierce, Fenner & Smith, Inc., Computer Sciences' stock "should do well over the next 12 months, even though it has come a long way already." During the past year, Computer Sciences shares appreciated 125%.

McClellan recommends Computer Sciences because of its momentum in the burgeoning systems integration market and its highly visible earnings growth owing to a large backlog of business. McClellan estimates Computer Sciences will earn $1.95 per share in fiscal 1987, which ends March 31, and $2.40 per share in fiscal 1988.

Likewise, Steven Ossad, analyst with L.F. Rothschild, Unterberg Towbin, says Computer Sciences is still undervalued. According to Ossad, Computer Sciences could offer even more rapid growth than the 20% annual earnings gains he projects because the company's earnings are "highly sensitive on the upside to relatively small margin changes." Ossad contends Computer Sciences could claim the kind of multiple investors now attached to Electronic Data Systems Corp. (GME — 44⅝), which trades at roughly 20 times calendar 1986 earnings.

But Christopher Mortenson, analyst with Alex Brown & Sons, says that at current price levels, Computer Sciences is "pretty fully priced." Mortenson recommends Planning Research, which he estimates earned $1.15 per share for fiscal 1986, ended June 30, and will earn $1.50 to $1.60 per share in the current fiscal year.

In recent weeks, Planning Research has backed off its 52-week high of 24 points. "There is a little near-term uncertainty reflected," Mortenson says, "but this stems from events that confirm reasons for longer term investment." According to Mortenson, Planning Research is getting out of businesses "that it shouldn't be in," such as civil engineering, and is focusing on high value-added, high-margin businesses with larger and longer term contract opportunities.

Rothschild analyst David Baratta also recommends purchase of Planning Research. Baratta writes in a recent report that "the company is emerging from a period of depressed earnings" and is now positioned "to become a major systems development supplier to the government market, enabling it to bid on and win large contracts."

American Management Systems, Inc. (AMSY — 16½) is another attractive stock idea in this group, according to Mortenson of Alex Brown. American Management sells software products in conjunction with its professional services.

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

Semiconductor woes continue

From page 118

sales of $33.1 million; however, profits dropped 65% from 6 cents a share, or $2.1 million, a year ago.

The recession has also taken its toll on semiconductor equipment manufacturers like Varian Associates, Inc. of Palo Alto, Calif.

Last week the electronics supplier and semiconductor equipment company announced hiring freezes, a 5% reduction in its worldwide work force and a 10% pay cut for its executives.

The company said it hopes the moves will cut costs by as much as $30 million.

Varian currently has approximately 13,000 employees. A year ago, the company cut 1,700 employees from its work force.

MSA reports 25% revenue increase

By James A. Martin

ATLANTA — Management Science America, Inc. (MSA), continuing to rebound from the lackluster 1985 fiscal year, last week reported a 25% increase in operating revenue for its second quarter, with $47.6 million, compared with $38.1 million for the same quarter last year.

Net income was $5.9 million, or 33 cents per share, compared with 1985's net income of $3.1 million, or 17 cents per share. For the first six months of fiscal 1986, revenue was $77 million, compared with $63 million, while net income was $5.5 million, compared with $342,000.

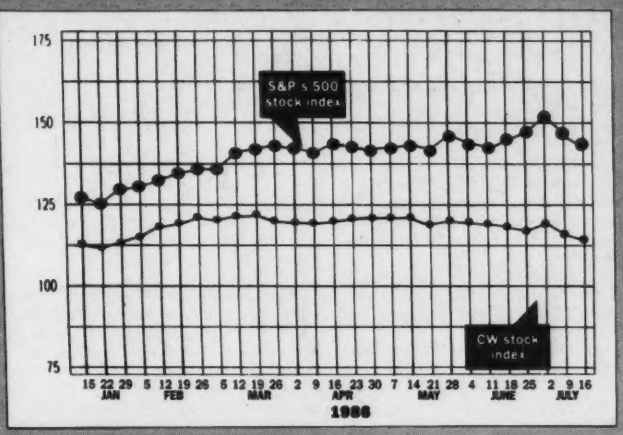
MSA's revenue and income increases were "very impressive," especially when compared with the strong second quarter of 1985, its best quarter that year, said Chris Mortenson, senior analyst with Alex Brown & Sons in New York.

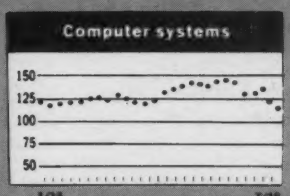
"MSA has been strong in the international market, and they have some good new products that help the whole product line," he added.

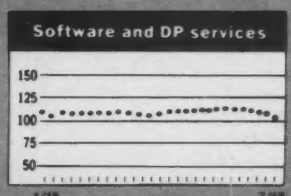
COMPUTER INDUSTRY

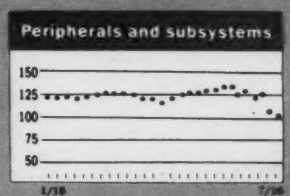
MITCHELL J. HAYES

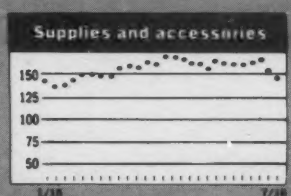
Computerworld stock trading index

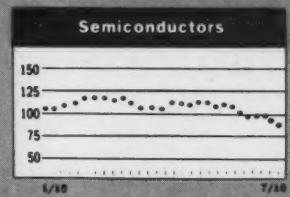












All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

	7/9/86	7/16/86
Computer systems	121.7	**114.0**
Software and DP services	104.9	**101.1**
Peripherals and subsystems	104.9	**101.4**
Supplies and accessories	150.1	**148.2**
Semiconductors	85.9	**80.1**
Leasing companies	103.9	**97.3**
CW stock index	113.5	**112.0**
Standard and Poor's 500 stock index	145.2	**140.5**

Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, JULY 16, 1986

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JULY 16 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS					
O	ALPHA MICROSYSTEMS	8	5	5.38	-0.3	-4.4
O	ALTOS COMPUTER SYS	19	10	13.50	-0.3	-1.8
A	AMDAHL CORP	19	10	16.88	-0.1	-0.7
O	APOLLO COMPUTER INC	23	9	10.63	-2.0	-15.8
O	APPLE COMPUTER INC	39	14	33.50	-1.1	-3.2
N	AT&T	26	20	24.00	-0.5	-2.0
N	BURROUGHS CORP	72	52	67.00	-3.0	-4.3
O	C P T CORP	7	4	4.13	-0.3	-5.7
N	COMPAQ COMPUTER CORP	18	8	12.25	-1.1	-8.4
A	COMPUTER CONSOLES INC	12	6	8.00	-1.0	-11.1
O	CONCURRENT COMP CORP	25	1	13.75	-1.3	-8.3
N	CONTROL DATA CORP DEL	29	15	22.75	-0.8	-3.2
O	CONVERGENT TECH	14	6	6.75	-0.5	-6.9
N	CRAY RESH INC	100	44	86.38	-3.1	-3.5
O	DAISY SYS CORP	32	8	8.38	-1.4	-14.1
N	DATA GEN CORP	50	31	32.63	-1.4	-4.0
N	DATAPOINT CORP	13	5	7.00	-0.1	-1.8
N	DIGITAL EQUIP CORP	94	49	84.00	-5.5	-6.1
N	ELECTRONIC ASSOC INC	7	4	4.00	-0.9	-17.9
N	FLOATING POINT SYS INC	46	23	33.88	-0.6	-1.8
N	GOULD INC	38	18	17.88	-3.1	-14.9
N	HARRIS CORP DEL	36	22	33.38	-3.0	-8.2
N	HEWLETT PACKARD CO	48	29	36.38	-5.0	-12.1
N	HONEYWELL INC	87	59	69.00	-4.5	-6.1
N	IBM	162	122	133.13	-11.1	-7.7
O	IPL SYS INC	4	1	3.00	+0.0	+0.0
N	ITT CORP	60	31	53.00	-1.8	-3.2
N	M A COM INC	23	13	16.25	+0.5	+3.2
N	MATSUSHITA ELEC INDL LTD	100	49	81.50	-0.4	-0.5
O	MENTOR GRAPHICS CORP	23	12	12.38	-2.8	-18.2
N	MODULAR COMPUTER SYS	9	6	8.88	+0.0	+0.0
N	MOHAWK DATA SCI CORP	4	1	2.50	+0.1	+5.3
N	NBI INC	20	10	11.50	+0.3	+2.2
N	NCR CORP	57	31	50.13	-2.3	-4.3
N	PRIME COMPUTER INC	28	15	16.38	-1.5	-8.4
N	SPERRY CORP	76	46	75.25	+0.1	+0.2
O	STRATUS COMPUTER	26	15	18.75	-2.0	-9.6
O	SYMBOLICS INC	16	7	7.25	-0.9	-10.8
O	TANDEM COMPUTERS INC	34	13	28.75	-3.0	-9.4
N	TANDY CORP	45	30	33.38	-2.6	-7.3
N	TEXAS INSTRS INC	148	88	110.75	-9.1	-7.6
A	ULTIMATE CORP	35	11	22.63	-3.8	-14.2
A	WANG LABS INC	23	13	13.00	-1.3	-8.8
A	WANG LABS INC	23	13	13.00	-1.6	-11.1
N	XEROX CORP	72	46	50.88	-4.6	-8.3
	SUPPLIES & ACCESSORIES					
N	AMER BUSINESS PRODS	37	25	33.13	+1.0	+3.1
N	BARRY WRIGHT CORP	25	17	17.75	-0.4	-2.1
A	DUPLEX PRODS INC	23	17	18.88	-1.9	-9.0
N	ENNIS BUSINESS FORMS INC	28	15	24.00	-1.4	-5.4
N	3M CO	115	74	106.13	-3.0	-2.7
N	MOORE LTD	28	18	25.38	-0.4	-1.5
O	STANDARD REGISTER CO	50	30	37.00	-3.0	-7.5
N	WALLACE COMPUTER SVCS	50	33	46.25	-0.5	-1.1

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JULY 16 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & DP SERVICES					
O	ADVANCED COMP TECH	7	3	4.88	+0.0	+0.0
N	ADVANCED SYS INC	20	11	16.63	-0.9	-5.0
N	AGS COMPUTERS INC	25	14	17.75	-1.4	-7.2
O	AMERICAN MGMT SYS INC	20	6	16.50	-0.3	-1.5
O	AMERICAN SOFTWARE INC	15	9	12.25	+0.8	+6.5
N	ANACOMP INC	7	3	5.00	-0.4	-7.0
O	ANALYSTS INTL CORP	11	5	5.50	+0.0	+0.0
O	ASHTON TATE	34	10	24.63	-0.6	-2.5
O	ASK COMPUTER SYS INC	15	7	9.88	-0.1	-1.3
O	ASTRADYNE COMP IND	3	1	1.38	+0.0	+0.0
N	AUTOMATIC DATA PROC	39	18	31.13	-2.9	-8.5
O	COMPUTER ASSOC INTL INC	25	10	20.00	-2.0	-9.1
O	COMPUTER HORIZONS CORP	15	10	11.25	-0.1	-1.1
O	COMPUTER NETWORK TECH	10	2	6.94	-0.4	-5.1
N	COMPUTER SCIENCES CORP	40	19	33.75	-1.9	-5.3
O	COMPUTER TASK GROUP INC	19	11	12.75	+0.0	+0.0
O	COMPUTONE SYS INC	7	3	2.75	-0.3	-8.3
O	COMSHARE INC	13	9	12.00	-0.5	-4.0
N	CULLINET SOFTWARE INC	28	10	11.25	-0.9	-7.2
O	CYCARE SYS INC	17	10	12.00	-1.9	-13.5
O	DUQUESNE SYS INC	45	11	26.75	-1.3	-4.5
N	GENERAL ELEC CO	83	56	75.50	-1.1	-1.5
N	GENERAL MTRS CORP	50	33	43.25	-1.6	-3.6
N	GTE CORP	56	38	54.75	+1.6	+3.1
O	HOGAN SYS INC	12	4	10.63	+0.0	+0.0
O	INFORMATION SCIENCES INC	4	1	3.00	+0.0	+0.0
O	INFOTRON SYS CORP	23	13	13.00	-2.0	-13.3
O	KEANE INC	19	12	14.00	-0.3	-1.8
N	LOGICON INC	43	28	28.25	-2.9	-9.2
O	LOTUS DEV CORP	39	15	35.50	+0.8	+2.2
O	MANAGEMENT SCI AMER	16	8	13.00	-0.6	-4.6
O	MCI COMM CORP	13	8	9.88	+0.0	+0.0
O	MICOM SYS INC	23	12	11.75	-0.5	-4.1
O	MICRO PRO INTL CORP	4	2	2.25	+0.3	+16.1
O	MICROSOFT CORP	36	26	29.00	+1.0	+3.6
O	NATIONAL DATA CORP	26	11	17.38	-1.0	-5.4
O	ON LINE SOFTWARE INT	16	6	11.75	-1.3	-9.6
O	ORACLE SYS CORP	29	17	17.75	-6.3	-26.0
N	PANSOPHIC SYS INC	36	16	27.25	-1.1	-4.0
N	PLANNING RESH CORP	24	14	17.25	-1.4	-7.4
O	POLICY MGMT SYS CORP	24	15	15.25	-2.0	-11.6
O	PROGRAMMING & SYS INC	11	5	8.63	-1.3	-12.7
O	REYNOLDS & REYNOLDS CO	35	18	30.00	-1.8	-5.5
O	SCIENTIFIC COMPUTERS INC	6	4	4.38	-0.1	-2.8
O	SEI CORP	28	16	16.00	-0.5	-3.0
O	SHARED MED SYS CORP	41	29	32.38	-0.6	-1.9
O	SOFTWARE AG SYSTEMS INC	22	13	17.38	-0.9	-4.8
O	SOFTWARE PUBG CORP	13	5	5.38	+0.1	+2.4
A	STERLING SOFTWARE INC	21	7	17.38	-1.3	-6.7
N	UCCEL CORP	23	13	20.00	+0.8	+3.9
N	URS CORP	18	10	16.25	+0.8	+4.8
O	VM SOFTWARE INC	32	17	26.00	+0.4	+1.5
	SEMICONDUCTORS					
N	ADVANCED MICRO DEV	34	14	14.50	-4.3	-22.7
N	ANALOG DEVICES INC	25	14	15.75	-1.1	-6.7
O	ANALOGIC CORP	16	11	11.13	-0.1	-1.1
N	APPLIED MAGNETICS CORP	20	12	15.25	-0.8	-4.7
O	AVANTEK INC	24	17	17.38	+0.3	+1.5
O	HADCO CORP	7	4	4.75	-0.4	-7.3
O	INTEL CORP	32	18	18.38	-3.1	-14.5
O	MICRO MASK INC	8	3	3.75	+0.3	+7.1
N	MOTOROLA INC	50	29	34.13	-3.0	-8.1
N	NATIONAL SEMICONDUCTOR	16	9	9.50	-1.6	-14.6
N	TERADYNE INC	30	17	19.13	-2.0	-9.5

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JULY 16 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	PERIPHERALS & SUBSYSTEMS					
A	AM INTL INC	9	3	7.00	+0.1	+1.8
A	ANDERSON JACOBSON INC	3	2	2.13	+0.0	+0.0
O	AST RESH INC	33	11	11.50	-2.5	-17.9
O	AUTOTROL CORP	10	6	7.88	+0.3	+3.3
O	AVANT GRADE COMPUTING	10	3	3.75	+0.4	+11.1
O	BANCTEC INC	13	7	7.50	-0.5	-6.3
N	BOLT BERANEK & NEWMAN	48	27	40.00	-2.0	-4.8
O	CAMBEX CORP	2	1	1.00	+0.0	+0.0
N	CENTRONICS DATA COMP	8	3	6.88	+0.3	+3.8
A	CETEC CORP	9	6	7.13	+0.0	+0.0
A	COGNITRONICS CORP	6	4	3.88	+0.0	+0.0
N	COMPUGRAPHIC CORP	30	19	19.13	-0.4	-1.9
N	COMPUTERVISION CORP	19	9	11.75	-2.0	-14.5
N	CONRAC CORP	18	11	14.75	-1.0	-6.3
A	DATAPRODUCTS CORP	18	11	14.63	-0.3	-1.7
A	DATARAM CORP	18	4	7.13	-0.5	-6.6
O	DATA SWITCH CORP	9	4	6.50	+0.1	+2.0
O	DATUM INC	7	5	5.63	+0.3	+4.7
N	DECISION INDS CORP	15	10	11.13	-0.8	-6.3
O	ENDATA INC	8	3	6.13	-0.3	-3.9
O	EVANS & SUTHERLAND	27	15	20.38	-1.1	-5.2
N	FLOATING POINT SYS INC	46	23	33.88	-0.6	-1.8
O	GANDALF TECHNOLOGIES	8	5	6.31	-0.1	-1.0
N	GENERAL DATACOMM IND	15	8	10.75	+0.0	+0.0
N	HAZELTINE CORP	30	16	19.50	+1.0	+5.4
O	ICOT CORP	13	6	9.75	-0.4	-3.7
O	INFORMATION INTL INC	18	10	16.25	+0.3	+1.8
O	INTECOM INC	7	3	4.56	-0.1	-2.7
O	INTERLEAF INC	15	10	10.00	-1.6	-14.0
O	MEGADATA CORP	5	3	3.63	+0.0	+0.0
A	MSI DATA CORP	14	8	11.00	-0.5	-4.3
N	NASHUA CORP	28	12	22.88	-1.3	-5.2
O	NETWORK SYS CORP	27	10	11.00	-1.1	-9.3
N	NORTH AMERN PHILIPS CORP	48	32	39.13	-3.3	-7.7
N	NORTHERN TELECOM LTD	40	25	27.38	-1.5	-5.2
O	NOWELL INC	21	9	18.50	-1.3	-6.3
O	OMEX	1	0	0.63	+0.0	+0.0
N	PARADYNE CORP	13	6	6.88	-0.9	-11.3
A	PENRIL CORP	10	6	5.75	-0.3	-4.2
N	PLESSEY PLC	38	19	31.88	-1.4	-4.1
O	PRINTRONIX INC	15	10	12.00	-1.0	-7.7
O	QMS INC	16	6	13.13	-0.4	-2.8
O	RAMTEK CORP	7	2	5.13	-0.4	-6.8
N	RECOGNITION EQUIP INC	17	9	11.25	-0.3	-2.2
N	SANDERS ASSOC INC	63	29	59.50	+2.8	+4.8
O	SCAN TRON CORP	24	12	17.75	-2.3	-11.3
N	SCIENTIFIC ATLANTA INC	15	9	9.50	-0.5	-5.0
O	SEAGATE TECHNOLOGY	14	5	11.38	+0.5	+4.6
N	STORAGE TECHNOLOGY	7	1	2.88	-0.6	-17.9
O	SUN MICROSYSTEM INC	20	12	13.13	-1.1	-7.9
A	T-BAR INC	7	5	5.25	-0.1	-2.3
A	TAN PRODUCTS CO	15	10	13.75	+0.5	+3.8
O	TANDON CORP	8	3	5.00	-1.1	-18.4
A	TEC INC	11	4	4.13	-0.1	-2.9
N	TEKTRONIX INC	66	47	56.75	-2.4	-4.0
O	TELEVIDEO SYS INC	4	2	3.25	+0.4	+13.0
N	TELEX CORP	69	40	52.75	-3.0	-5.4
N	TIMEPLEX INC	24	14	15.88	-0.1	-0.8
N	TITAN CORP	12	5	9.00	+0.1	+1.4
O	VISUAL TECHNOLOGY INC	2	0	0.50	+0.0	-4.8
O	WYSE TECH	19	7	13.75	-1.3	-8.3
	LEASING COMPANIES					
N	COMDISCO INC	25	10	18.25	-1.8	-8.8
N	CONTINENTAL INFO SYS	12	5	9.50	-1.1	-10.6
O	FINALCO GROUP INC	5	3	3.25	-0.3	-7.1
O	PHOENIX AMERN INC	8	2	3.75	-0.1	-3.2
O	SELECTERM INC	12	6	6.50	-0.3	-3.7
N	U.S. LEASING	46	32	40.00	-2.0	-4.8

COMPUTER INDUSTRY

INSIDE

After a year of layoffs and financial losses, Walker Interactive Products appears to be resurfacing/**87**

Strong opposition emerges to Sen. Robert Dole's proposal for deregulating the regional holding companies/**90**

Management Science America reports a 25% revenue increase for the second quarter/**116**

INSTANT ANALYSIS

"I am gratified that senior management from both companies have started to work together as partners."

— Burroughs Corp. Chairman W. Michael Blumenthal commenting on the efforts to merge Burroughs and Sperry Corp.

IBM earnings slide again

Blue second-quarter net drops 7.7% from '85 level

By Alan Alper

NEW YORK — Despite registering a modest increase in revenue, IBM last week reported that second-quarter earnings declined from the year-earlier period. The company said the situation was caused by persistently weak demand in North America for computer equipment and extreme profit margin pressure.

The net profit for the quarter, which decreased 7.7% to $1.3 billion, or $2.12 a share, from the comparable period in 1985, was slightly below analysts' expectations. The second-quarter shortfall caused the first-half net to decline by 3.2% to $2.32 billion, or $3.77 a share.

Second-quarter revenue increased 7.3% to $12.26 billion and by 5.6% for the first half to $22.39 billion. IBM's rental revenue fell by 36.1% in the quarter to $680 million, in line with its strategy of steering customers toward outright product purchases.

Although analysts were not expecting much improvement from the first quarter's subpar results when equipment sales dipped slightly [CW, April 14], many were still disappointed with the second-quarter earnings performance.

"Clearly, product mix and volume, price cuts and their fixed cost structure hurt them," noted Michael Geran, an analyst with E. F. Hutton & Co.

Despite the revenue increase, Geran and other analysts maintain that IBM had not done enough to lower costs, a suggestion borne out by sagging profits.

In the second quarter, cost of sales, services, rentals and expenses increased by 13.8% to $10.34 billion, widening first-half expenditures to $18.91 billion, up 11% from the year-earlier period.

See **IBM** page 88

Semiconductor woes continue

By Maura McEnaney

SUNNYVALE, Calif. — Advanced Micro Devices, Inc. (AMD) led off the list of bad news from the semiconductor industry last week, announcing first-quarter losses of $28 million. Sales for the quarter were flat at approximately $153.9 million.

The massive loss prompted some speculation that AMD, which has a long-standing no-layoff policy, is considering implementing a four-day work week sometime this summer.

Despite a beefed up marketing program and analysts' anticipation of an industry turnaround this year, AMD's losses climbed from $16 million during the previous quarter on sales of $153.3 million. Sales were up only slightly over year-ago totals of $153 million.

Some analysts said the loss is due in part to a sales force exodus that has been occurring at AMD over past several months. "AMD has had a remarkable losing streak," said Steve Szirom, president of HTE Management, Inc. Although the company has been known for its strong sales and marketing force, many top-level managers went to start-up companies after they saw evidence of flat sales, Sziron said.

While losses at commodity chip vendors such as AMD are climbing, vendors of application-specific integrated circuits are registering increased revenues, but at somewhat slower rates.

Application-specific integrated circuit manufacturer LSI Logic Corp. of Milpitas, Calif., reported income of two cents a share, or $768,000, on $47.9 million in revenue for the second quarter ending in June. Revenue was up 45% over year-ago

See **SEMICONDUCTOR** page 116

INDUSTRY INSIGHT
Clint Wilder

Hit list: Top 10 cliches

Researching the computer industry's 10 greatest marketing and corporate cliches does not take a lot of effort. That should come as no surprise to MIS directors who must endure more vendors' dog-and-pony shows than all trade press reporters combined. Cutting through all the puffery is a skill learned by months of experience with buzzwords, hype and empty promises. And, if anything, the industry slump has made it worse.

With that preface, following is the 1986 Top 10, in no particular order, with appropriate explanations, comments or antidotes.

1. "We offer solutions, not just products." This statement is meant to imply a contrast with the rest of the industry, but just try to find a vendor that says the opposite. If this were really true, one suspects, the industry would not be in the slump it is in today.

2. The expenses strategy justification. In this two-part entry for vendors experiencing financial difficulty, the vendor simply picks the justification that suits the company's course of action.

If the company is losing money because expenses are outpacing income, then the vendor is "maintaining its strong investment in research and development, maintenance and customer support to ensure its long-term ability

See **HIT** page 92

Wilder is Computerworld*'s senior editor, computer industry.*

Hardware vendors' reports reflect sluggish domestic demand

Burroughs and NCR fly in face of slump

By Alan Alper

NEW YORK — Most large-system and communications hardware vendors are still reeling from prolonged, lackluster domestic demand for their products.

Led by IBM, the flurry of financial reports released last week continued to cite softness in domestic capital expenditures for revenue and earnings woes. While Honeywell, Inc. and others spoke of persistent sluggish demand, there were notable exceptions. NCR Corp., for the fourth consecutive quarter, chalked up record earnings and revenues, and Burroughs Corp. reported an improving business outlook.

The industrywide problem, according to Frank Gens, an analyst at International Data Corp. of Framingham, Mass., is multidimensional. "If you look at it, some of it relates to the soft economy, some of it can be blamed on budgetary cutbacks and some of it is the inability of organizations to absorb automation," he said.

Leading companies reporting results for the quarter ended in June were the following:

Honeywell. Chairman Edson Spencer cited ongoing weak domestic capital expendures as the cause of drastically lower earnings in Honeywell's Information Systems unit. While U.S. orders in the second quarter exceeded the previous period, they "lagged" behind the year-earlier quarter, Spencer added.

The firm's 31.2% drop in second-quarter income to $36.1 million, or 80 cents a share, was in line with analysts' expectations. "It looks like it will be a depressed year for them with earnings down 10% from last year's already depressed levels," not-

See **VENDORS** page 116

Mixed signals in second quarter

Some vendors prosper, while others continue to experience sagging profits

Company	Net income April-June, 1986 (thousands of dollars)	Percent Change From 1985	Revenue April-June, 1986 (thousands of dollars)	Percent Change From 1985
Apple	32,333	*	448,270	+20
Apollo	1,041	−85	88,382	+1
Burroughs	76,200	+41	1,337,600	+9
Computer Consoles	(886)	**	33,085	−5
Honeywell	36,100	−31.2	1,730,000	+11.8
IBM	1,305,000	−7.7	12,268,000	+7.3
Lotus	11,520	+10	86,195	+10.5
Micom Systems	1,662	−69	46,092	−1
NCR	78,643	+18	1,168,835	+13
Oracle	2,580	+76	20,835	+146
Computer Sciences	6,652	+28	233,998	+25

Parentheses indicate loss
* Reported loss of $17.2 million
** Reported loss of $4.6 million

Information supplied by vendors or companies

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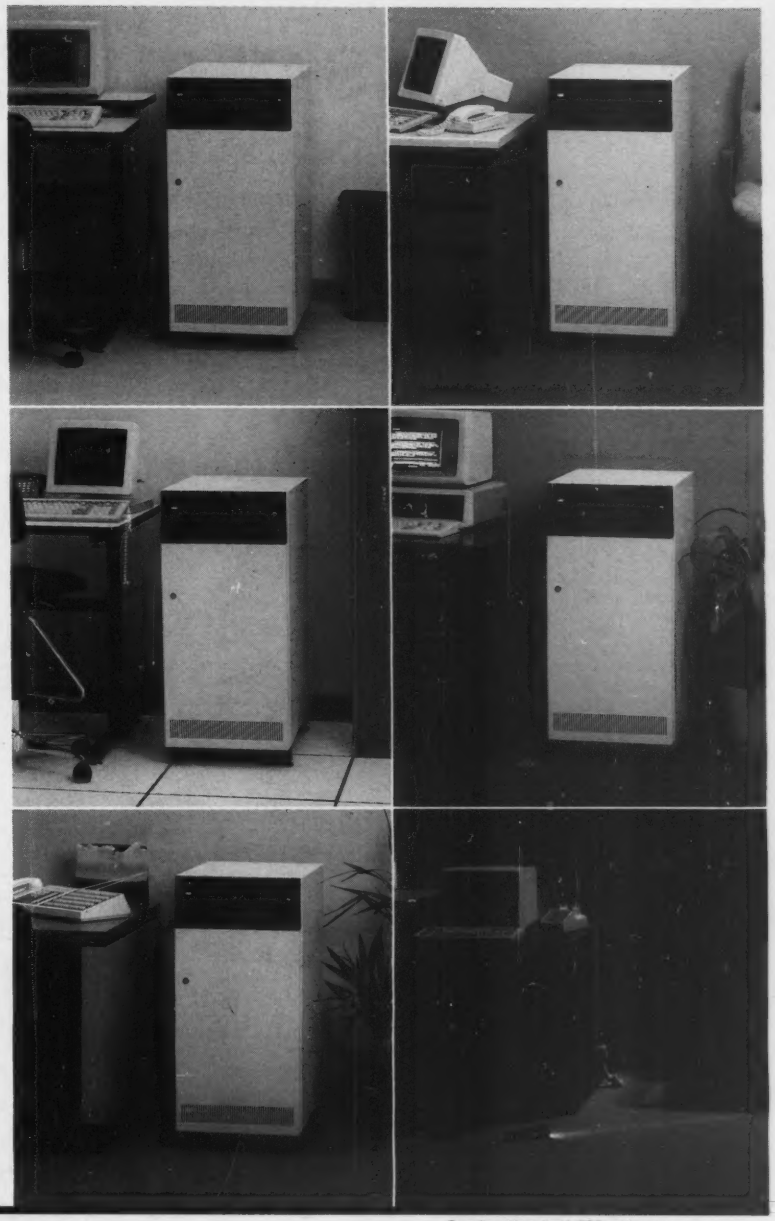

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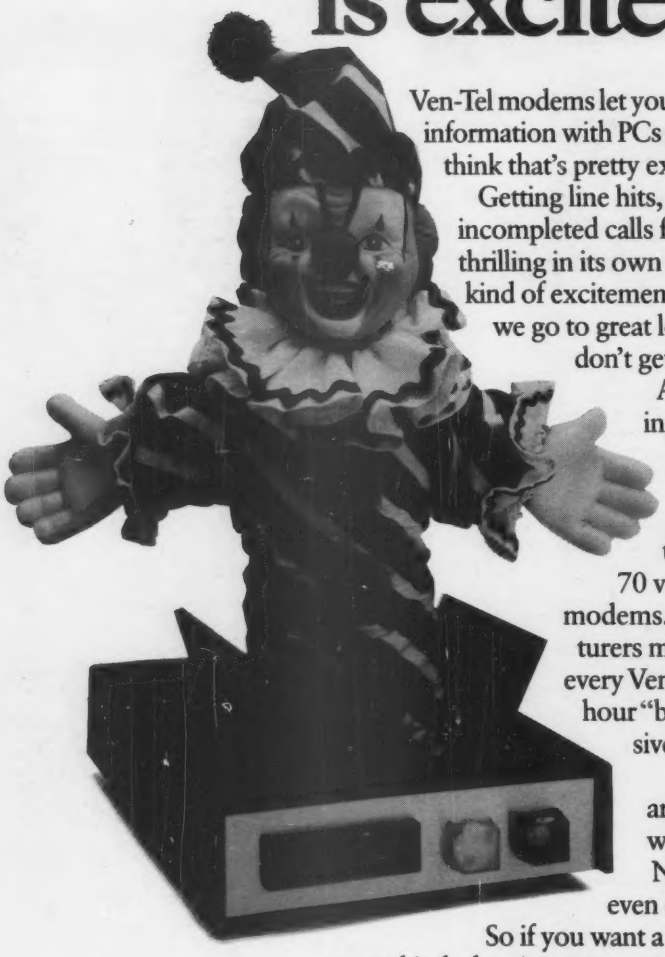
The last thing you want from your modem is excitement.



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